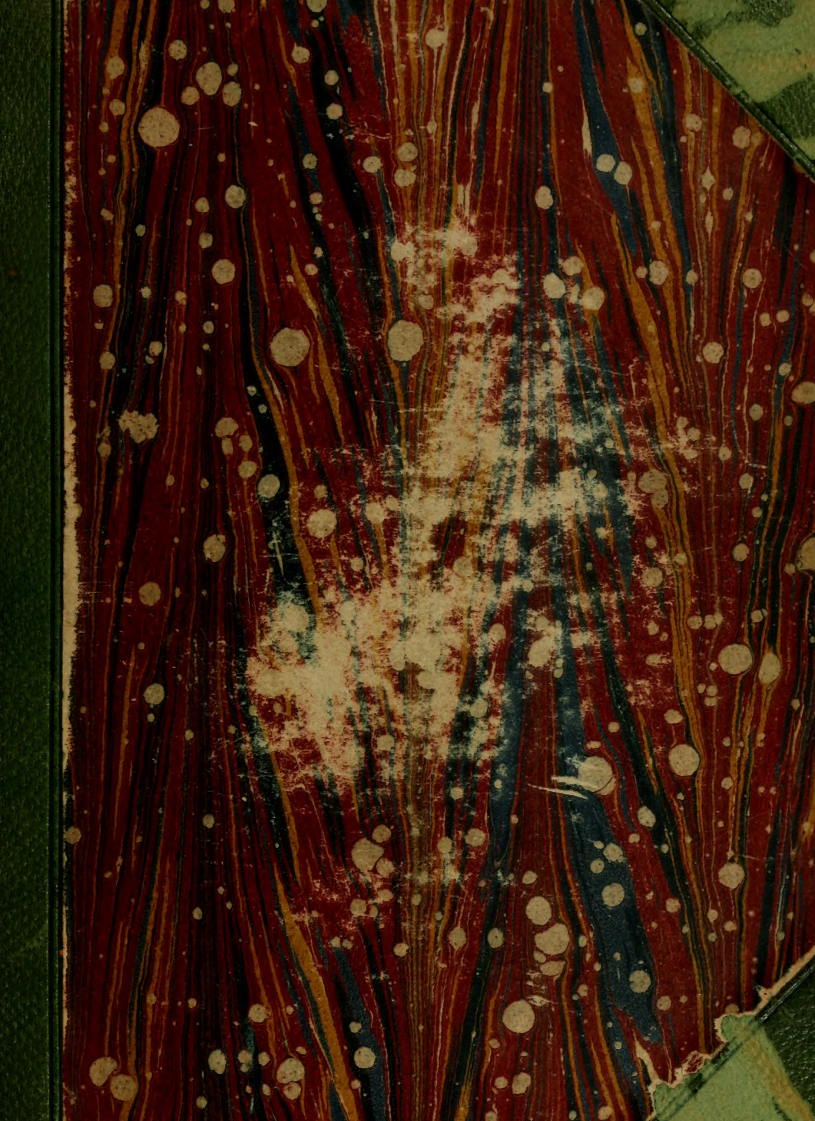
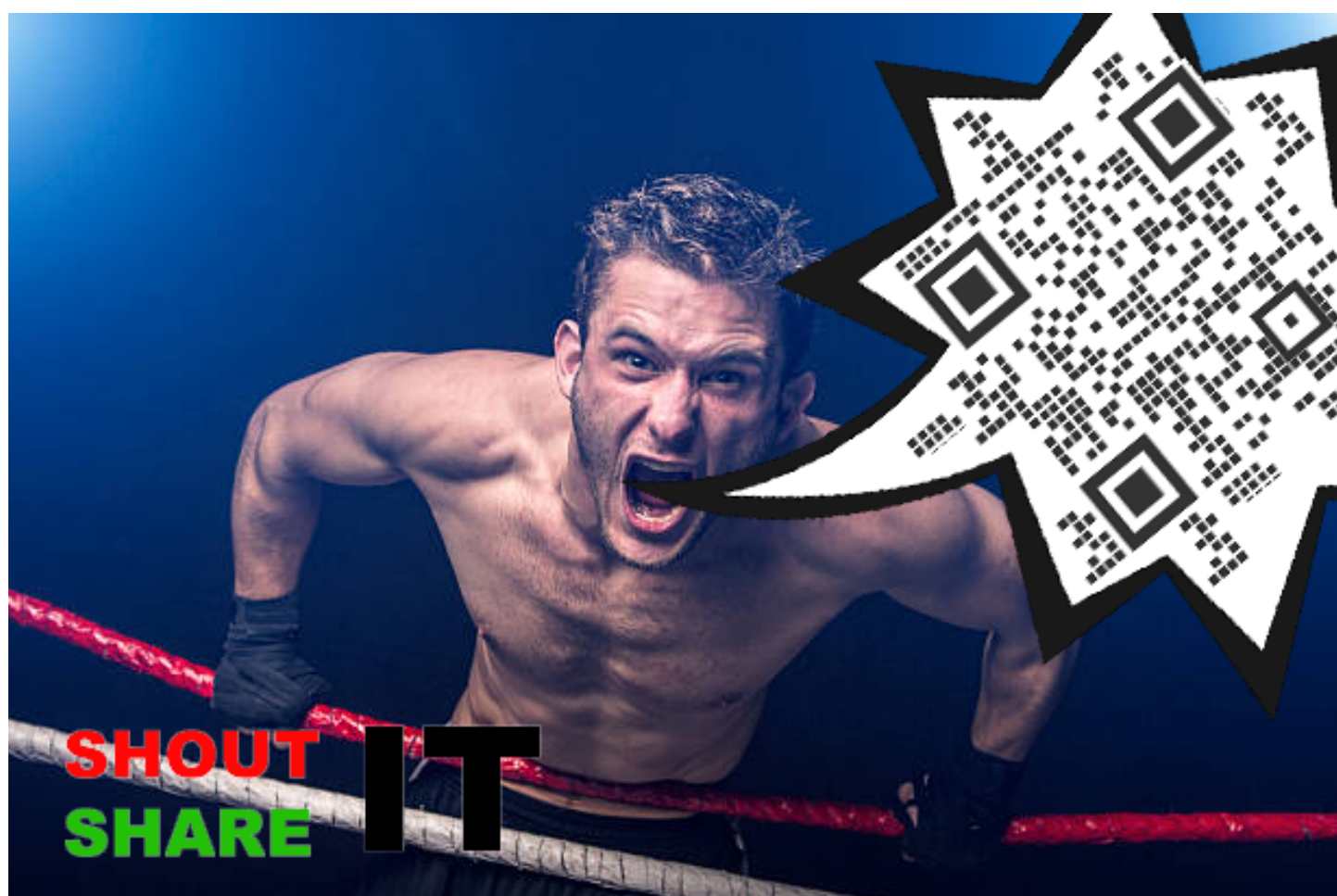






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POPULAR
HISTORY OF BRITISH CRUSTACEA.

A
POPULAR HISTORY
OF
BRITISH CRUSTACEA;

COMPRISING

A FAMILIAR ACCOUNT OF THEIR CLASSIFICATION
AND HABITS.

BY

ADAM WHITE,

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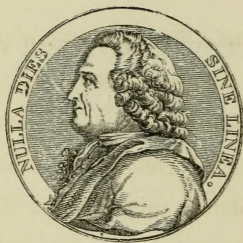
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POTENTIAL HISTORY
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PREFACE.



IN the following little Work there are brief descriptions of upwards of four hundred species of Crustacea, found in and around the British Islands. The dredgings of Messrs. Couch, M'Andrew, the Thompsons, Gosse, Spence Bate, and others, have shown that Colonel Montagu and Dr. Leach, with their correspondents, had only opened the rich field of this branch of Marine Zoology, while Dr. Baird, by his gatherings and discoveries among our fresh waters, has nobly occupied ground which, in this country at least, had been all but neglected before his time. The admirable work of Professor Bell, on the 'British Stalk-eyed Crustacea,' contained many species, and at least one remarkable genus, previously undescribed; while the publication of that

work has stimulated the exertions of naturalists, so that species of the group, previously unknown, are added almost every year to our Fauna. Dr. Kinahan has described, only a month ago, a fine distinct new species of *Crangon*, dredged in the Irish Sea, where Professors Allman and Melville and the late Mr. Thompson of Belfast were so successful. The researches of Mr. Spence Bate and his correspondents have quadrupled the list of Amphipods, while naturalists eagerly expect the fine work on these Crustacea and their allies, which he and Mr. Westwood are preparing to publish in the same form as that of Professor Bell.

In the following popular history of British Crustacea, the general arrangement is that of the classical 'Histoire Naturelle des Crustacés,' by Professor Milne-Edwards. Among the *Amphipoda*, I have been chiefly guided by Mr. Spence Bate's synopsis, published in the February number of the 'Annals and Magazine of Natural History.' In the Entomostracous portion, I have compiled almost exclusively from Dr. Baird's valuable volume, published by the Ray Society, adding a few species discovered by Dr. Baird and

Mr. Rupert Jones since the publication of the work. For many valuable extracts on the habits of the Crustacea, I am indebted to the various papers and works of Colonel Montagu and Messrs. Gosse, Couch, Kingsley, Goodsir, and others. The plates have been drawn by Mr. G. B. Sowerby, F.L.S., chiefly from specimens in the cabinets of the British Museum. The figures of Entomostraca have been for the most part selected with Dr. Baird's kind permission from his volume on the subject. For the drawings of all the figures in Plate X., as well as for the original figure of *Peltidium*, I am indebted to the kindness of Mr. Spence Bate. For various valuable notes on habitats of the many rare British Crustacea dredged by the Rev. Alfred Norman, and for a few curious notices of the Guernsey Crustacea, I am indebted to the Rev. Alfred Norman and Dr. Lukis.

A. W.

June, 1857.

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POPULAR HISTORY
OF
BRITISH CRUSTACEA.

INTRODUCTION.

A LONDON fishmonger told the writer that some of the largest shell-fish dealers in the Metropolis sold, every year, as many as *sixty thousand* Lobsters and *twelve thousand* Crabs. He assured him that many an ordinary fishmonger in London found sale for some *eight or ten thousand* of these Crustacean commodities. But who can calculate the number of Shrimps and Prawns consumed annually in London by those who are fond of such dainties? Bushels of the former are daily sold in Billingsgate to be retailed by the pint, there being from 100 to 150 Shrimps in every pint; while hundreds of pounds' weight of Prawns meet with purchasers, who find 200 Prawns in every pound, and

retail them by the dozen. These are the chief Crustacea eaten in London, exclusive of thousands of the Shore Crab, which may be seen, by the side of Whelks and Periwinkles, on stalls in the poorer neighbourhoods, where they find ready purchasers in many a ragged *gourmand*.

The great Craw-fish, or Thorny Lobster, and a limited number of the small fresh-water Cray-fish—in all, some eight or ten species of Crustacea—exhaust the list of the members of this class of animals, sold as food in our Metropolis. Although Crustacea directly do not greatly add to our supplies of food, yet they indirectly assist very materially in contributing to our wants. The great mass of fish derive their principal food from the smaller members of this class, which swarm in our seas by myriads; and, in this way, Crustacea contribute greatly to our comfort. They are the nutritious food not only of vast shoals of fish, but of swarms of sea-birds, some of which feed almost exclusively on them, particularly in the Arctic parts of the ocean. Crustacea also form the bulk of the food which supports the vast bodies of the Whale tribe, as may be seen somewhat further on, under the description of the *Mysididæ*, one of the families of the order *Stomapoda*. The small terrestrial species,—such, for instance, as the little Hog-lice of the genera *Oniscus* and

Porcellio,—are greedily eaten by our poultry and by many of the smaller birds, who find these exquisite titbits creeping among stones, or at the roots of trees. We must look, too, at the members of this class in another point of view ; they are pre-eminently the scavengers of the sea, removing and assimilating many an object which would otherwise prove a nuisance. On this part of the subject we may quote the words of one who has long studied the subject both on our own coasts and on the shores of foreign lands. Mr. Gosse remarks :—

“The Crabs are the scavengers of the sea ; like the wolves and hyænas of the land, they devour indiscriminately dead and living prey. The bodies of all sorts of dead creatures are removed by the obscene appetite of these greedy Crustacea ; and there is no doubt that many an enormous Crab, whose sapidity elicits praise at the epicure’s table, has rioted on the decaying body of some unfortunate mariner. But what of that ? Let us imitate the philosophy of the negro mentioned by Captain Crow. On the Guinea Coast, people are buried beneath their own huts, and the Land-crabs are seen crawling in and out of holes in the floor with revolting familiarity : notwithstanding which, they are caught and eaten with avidity. A negro, with whom the worthy Captain re-

monstrated on the subject, seemed to think this but a reasonable and just retaliation, a sort of payment in kind ; replying with a grin and chuckle of triumph, ‘ Crab eat black man ; black man eat *he* ! ’ ” *

Some of us have witnessed the moulting of a Crab, and mysterious does it seem to the novice in Natural History when he finds that a hard Lobster or Crab, with a coat of stony hardness, and which requires great strength of arm and knife, and even of hammer, sometimes, to open and cut or break it, casts off its old covering entire—the joint of every part of its thousand-jointed body, antennæ, foot-jaws, claws, and tail. And not only does it cast off these hard external parts, but the very linings of its gills, of its stomach, of its eyes and of other parts are thrown off, and thus, when the creature has escaped, the shell seems as perfect nearly as the animal itself. We often see cases from the Brazils of a gaudy *Grapsus*, more delicate even than the new-coated animal—seeing the parts are translucent ; and the cases are only the cast-off skins, rejected by what naturalists call *ecdysis*, but our Saxon forefathers would have termed moulting.

Mr. R. Q. Couch, a most able naturalist, remarked at the anniversary meeting of the Cornwall Natural History and

* Gosse’s Aquarium, p. 198.

Antiquarian Society,* that he could never understand how “that broad flat surface inside each claw could be got rid of without injury to the new claw ; however, by attentively watching the process in several instances,” he continues, “I observed that in the act of drawing out the new claw, the edge is cut through by these flat horny plates, the divided parts immediately closing again, and speedily becoming so adherent as to preclude their being re-opened.” He has also observed another fact, and it is this, that when “Crabs cast off their claws and get new ones, the process can take place only in the joint which is nearest the body ; if any other be injured, they bleed to death ; but if the nearest joint be removed, there is little blood lost, and over the wound a thin film forms, in the middle of which is a tubercle. The common opinion among naturalists appears to be, that the new claw immediately begins to form, and at the next casting of the shell it is perfected, though it be small ; but this is incorrect ; when the old claw is separated, the scar immediately forms, and remains till the creature casts its shell. After the shell is cast, the tubercle in the centre of the scar suddenly enlarges ; and under it may be discovered a small claw doubled on itself

* Nov. 1855, reported in ‘Zoologist,’ p. 4972.

beneath the membrane of the scar ; this remains in a soft state until the Crab again casts its shell, when the new claw is set at liberty, is straightened out, and becomes hard and calcareous like other parts of the body ; so that a claw, instead of being renewed and perfected at once, or at the first casting of the shell, is not so in reality until the shell has been cast the second time." Were a similar process to take place before the eyes of any one on a creature as bulky, say, as a buffalo, no flight of the imagination could conceive of anything more marvellous ; and yet it is a common occurrence, one of the works of Him whose ways and name are Wonderful.

From the observations of the late Sir John Dalyell, published in the Report of the British Association for 1851, we may state that Crustacea begin to throw off their shells even in the embryo state in which they first appear after having left the egg. After every change they assume more and more of their perfect form. While the Crab is young, and growing rapidly, frequent exuviations occur at brief intervals, from three to five in the course of a year. Just before the change the animal almost ceases to feed, and becomes rather inactive ; when the process has commenced it is effected in the course of a few hours, body and limbs

alike being relieved of their hard coating. The creature continues very shy until the new shell acquires firmness and strength, and retires into some crevice of a rock or stone. When Crustacea lose a limb by accidents or by rencontres with an enemy, it grows again at the next regular period of exuviation.

Professor Edwards and other eminent naturalists regarded the inner pair of the antennæ as being organs of smell, and the outer or longer antennæ as organs for hearing. Dr. Farre has shown in *Galathea*, Mr. Huxley in the *Stomapoda*, and Mr. Spence Bate in the Short-tailed Crabs, that the reverse of this is the case, the shorter antennæ being auditory organs, and the longer or outer antennæ being used in smelling, or at least in some similar function. Mr. Warrington's observations on the Shrimp, given further on, directly confirm the observations made by the needles, knives, and microscopes of these anatomists.

Mr. Wilson* relates in a very pleasing way a mode of catching Crabs used by the Arran fishermen, which may be new to most of our readers, as well as the moral he so cleverly derived from it.

* 'A Voyage round the Coasts of Scotland and the Isles,' by James Wilson, F.R.S.E: vol. i. p. 26.

“We happened to be astir in a small boat in Brodick Bay, about three o’clock one beautiful summer morning. Our chief object was to watch the soft uprising of those ‘fleecy folds, voluminous and vast,’ which during early twilight hours brood over the yet sombre valleys at the base of Goat-fell, and to watch the rosy tints as they descended from peak to peak, while

‘Fair Aurora, lifting up her head,
All blushing rose from old Tithonus’ bed.’

But we soon perceived two men in a small craft, who seemed quite unconscious that

‘The flaming chariot of the world’s great eye’

was now almost upon them. Their little boat hung motionless on the then waveless mirror of the Bay, in about ten feet depth of water; and after for a minute or thereby, holding their faces close upon the surface, they seemed suddenly to pull a long pole out of the water, with something adhering to its extremity. We soon found that they were taking advantage of the glassy stillness of the water to overlook the early walk of Crabs. They no sooner saw these crusty crustaceans on the subaqueous sand, than they poked them behind with their long staves; the Crabs turned

round to revenge the indignity, and, like Russian *gens-d'armes*, seized upon the unsuspecting poles. These latter were slightly shaken by the fishermen, as if in pain or terror; the angry creatures clung all the closer, and were then rapidly hoisted into the boat. The moral we drew at the time, and have since maintained, was, that neither Crab nor Christian should ever lose his temper."

The following definition of Crustacea is that given by Professor Milne-Edwards, in his classical work.* Animals with the body divided into rings which are generally very distinct, moveable, and horny or calcareous, without an inner skeleton properly so called, and bearing a double series of members, almost always very distinctly articulated, and forming the antennæ, jaws, etc., and legs, of which there are usually five or seven pairs. The nervous system is generally very distinct, ganglionic and longitudinal. The respiration is in general aquatic, and is always by the branchiæ or the skin; the circulation is in general very distinct; there is almost always an aortic heart, and proper blood vessels. The sexes are separate.

Many if not most of the Crustacea undergo, like Insects,

* 'Histoire Naturelle des Crustacés,' vol. i. p. 231. Many of the characters in the following work are compiled from the Professor's three vols.

curious transformations, so that in their early stages there is but little, if any, resemblance to the mature form.

The Crustacea are primarily divided into two natural groups, the smallest and the last treated in this work* having the mouth prolonged into a sucker, so that they are nourished from the animal fluids which they obtain from the creatures on which they are parasitic; the largest group contains the Crustacea whose mouths are furnished with jaws with which they masticate their food.

Of the latter group, the most important and largest series is that in which the eyes are borne on pedicels and are movable: hence their name, *PODOPHTHALMA*. In these the thorax is covered by a great shield called the carapace, while the legs are partly adapted for walking and partly for seizing. They form two orders, *DECAPODA* and *STOMAPODA*.

ORDER I. DECAPODA, *Latr.*

In the species of this Order the branchiæ are fixed on the sides of the carapace, and enclosed in special respiratory cavities. The mouth apparatus consists of six pairs of members, so that the number of thoracic legs is reduced to five

* The *Siphonostoma* and the *Lernæadæ*.

pairs, hence the name of the Order, Decapoda.* The order is divided into three suborders—*Brachyura*, *Anomoura*, and *Macroura*—the characters of which will be found under their respective heads.

Suborder I. BRACHYURA, *Latr.*

In the species of this division the abdomen is very slightly developed, and not employed to assist the animal in swimming; it is folded under the body, and has no traces of appendages on the segment which precedes the last. The sternal plate is rather wide between all the legs, and is never linear: the surface of the carapace generally divided by grooves, for the most part corresponding with the muscular insertions, and which circumscribe regions of the stomach, heart, genital organs, branchiæ, etc. The abdomen is generally very much wider in the females than in the males: in the latter it is more or less triangular, while in the former it is oval.

Tribe 1. OXYRRHYNCHITA, *M. Edw.*

Carapace contracted in front; front part projecting, and forming generally a very prominent beak.† Mouth ap-

* Δεκα, ten; πους, ποδος, a foot.

† Whence the name,—οξυς, sharp; ρυγχος, a beak.

paratus nearly quadrilateral, very broad in front, and far removed from the front. Orbits directed outwards. All the Crabs of this tribe seem to be essentially maritime. None of them live in fresh water, or seem to frequent the shore. They are generally found in very deep water; and, notwithstanding the legs in most cases being very long, their motions are generally sluggish, and when taken from the water they quickly perish.

The legs of this family of Crabs are generally long and very slender; and, as Mr. Gosse remarks, they tempt us to think that, if we were so furnished, "we might cover the ground in a style that would put to shame the old giant-slayer's seven-league boots."

Mr. Couch, in his 'Cornish Fauna,' Part I., pp. 66, 67, observes that the length of the legs in this set of Crabs "necessarily leads to slowness of motion, but they are well fitted to a residence among rocks and stones covered with seaweeds, among which they stride with little difficulty. In the winter they become almost if not altogether torpid, concealing themselves at this season either in deep crevices of rocks or imbedded in the soil; for the Corwich Crab has been observed, when caught at the time of its first activity in April, to have the inequalities of its carapace covered with the mud

of the bottom. It is, perhaps, at this period of repose that the crops of seaweeds and corallines fix themselves, as they are often seen beautifully adorning them; shells of different species, but especially Oysters and Mussels, are also found adhering, and on the smaller kinds, as of *Inachus* and *Pisa*, sponge will grow so luxuriantly as to conceal the whole carapace, with tufts on the legs to the extremities."

These long-legged Crabs are frequently covered with seaweeds, sponges, and other marine productions, which so completely change their appearance as to render them no longer recognizable. In this way *Macropodia occidentalis* (Gulding, Linn. Trans. xiv. 335) disfigures itself in the West Indian Seas, and watches for its prey. The British Spider Crabs (*Inachus* and *Arctopsis*) are often completely covered with masses of algæ, the roots of which take a secure hold amongst the hairs that clothe the carapace and limbs (Bell's Brit. Crust. p. 24). Say and Le Sueur fancied that these marine productions were merely entangled mechanically,* but there can be no doubt that they grow and flourish on their strange locality.

Professor Bell has watched the *Arctopsis* (*Pisa*) *tetraodon* waiting for its prey. He remarks that the Crabs of this

* Journ. Acad. Sc. Phil. vol. i. p. 80.

species, "notwithstanding their timid and lazy character, seize the object of their anger by a sudden and unexpected snap, and nip with great force, holding on with extraordinary firmness and tenacity, although unable, from the bluntness of their pincers, to inflict a wound."* He was reminded of the mode employed by the slow-paced Lemur (*Otolionus tardigradus*) when seizing a bird.

FAMILY I. *MACROPODIADÆ*,† *M. Edw.*

Legs slender and extremely long; the second or third pair always longer than the fore legs, and more than twice the length of the postfrontal portion of the carapace. Professor Milne-Edwards believes that the Crabs of this family live chiefly on marine worms, planariæ, and small mollusca.

Gen. I. *STENORHYNCHUS*,‡ *Lam.*

Carapace triangular, and produced in front into a beak-like projection, which is bifid. Orbits circular; eyes not retractile. Outer antennæ with the first joint very narrow; the second inserted on the sides of the beak, and the third much longer than the second. The mouth apparatus much

* Brit. Crust. p. 25.

† *Μακρος*, long; *πους*, *ποδος*, a foot.

‡ *Στενος*, slender, and *βυγχος*, a beak.



Sowerby del. et lith.

Vincent Brooks, Imp.

1. *Stenorhynchus tenuirostris*.

2. *Arctopsis lanata*.

longer than wide; outer jaw-feet narrow, third joint oval, fourth longish. Fore feet shorter, but much stouter than the others; the hand swollen, and the fingers slightly bent. Abdomen in both sexes of six joints.

STENORHYNCHUS ROSTRATUS,* L. sp. *Slender-legged Crab*.—Beak not reaching the end of the peduncle of the outer antennæ; epistome on each side with a little spine placed near the auditory organ; carapace above with various spines.

Appears to be common on the coasts of Great Britain and Ireland, from Orkney to Cornwall. The Rev. G. Gordon finds it in the Moray Firth (Zoologist, 3681), and Dr. Howden in the Firth of Forth, in sandy or muddy bottoms (Proc. Royal Phys. Soc. Edin. Jan. 1853). At Weymouth it spawns between May and August.

STENORHYNCHUS TENUIROSTRIS, Leach, sp. (Pl. I. fig. 1.) *Slender-beaked Spider Crab*.—Beak extending beyond the end of the peduncle of the outer antennæ; arms more slender than in the last species, and spinulose on the inner margin.

Not so common as the last; first found by Dr. Leach among Crustacea collected at Torquay, and found abun-

* *Cancer rostratus*, L.; *Cancer Phalangium*, Penn.

dantly in deep water on the coast of South Devon and Cornwall. In Scotland it is taken occasionally in the Moray Firth and on the coast of Berwickshire.

Mr. Thompson,* of Weymouth, describes it when alive as being of a lovely pink or puce colour. The ova are of a light orange-brown.

Gen. 2. ACHÆUS, *Leach*.

Beak very short. Outer antennæ with the first joint united to the front, and extending beyond the inner canthus of the eyes; the second joint inserted on the sides of the beak, and completely exposed from above. Third joint of the jaw-feet longer than wide, and nearly triangular, the fourth joint springing from its anterior and outer angle.

Fore legs slender and short, the other pairs filiform, the second ending in a straight, long nail; the terminal joint of the four last is large, compressed, and falciform. Abdomen in both sexes of six joints.

ACHÆUS CRANCHII, *Leach*. *Cranch's Spider Crab*.—Carapace with two tubercles in the median line. Abdomen in male and female six-jointed.

* Ann. Nat. Hist. 1853, xii. p. 68.

A small species, from six to eight lines long, first found by J. Cranch in Falmouth Bay, and named by Dr. Leach after that distinguished collector, who perished on the Congo expedition. Mr. Thompson, of Weymouth, dredged two specimens at Weymouth, August 18, 1852, in six fathoms, shingle and weedy bottom. One of these was a female, and had two single ova; they are of a deepish yellow colour. Mr. Eyton has got it off the Isle of Man. A specimen was taken at Penzance by Mr. Couch (Rev. A. Norman).

Gen. 3. INACHUS, *Fabr.*

Carapace about as wide as long, with a very short beak. Eye-peduncles can be folded back and lodged in the orbital cavity. Jaw-feet with the third joint longer than wide; nearly triangular, the fourth joint attached to its anterior and outer angle. First pair of legs very small in the female; in the male, rather thick, and sometimes three times the length of the body; the following legs cylindrical, those of the second pair always longer than the front pair; the four hind pairs end in a very long cylindrical joint, which is pointed and very slightly, if at all, bent; the abdomen formed of six joints.

The species of this genus are of small size, the body covered with down and hairs, among which Sponges and Zoo-phytes often grow.

INACHUS DORSETENSIS, Penn. sp. *Scorpion Spider Crab*.—Beak very short, wide, and deeply notched down the middle, the stomachal region of carapace furnished with five spines or tubercles, the middle and posterior are very large and strong, and four small spines are placed before them in transverse line.

First found at Weymouth, and subsequently over the south coast. Mr. Barlee dredged it in Shetland, and Dr. James Howden in the Firth of Forth. The Rev. George Gordon remarks that it is “the most abundant of the slender-legged Crabs in the Moray Firth. On one occasion twelve full-grown specimens were taken from the stomach of an ordinary-sized cod, of which fish in this locality it seems to be a favourite morsel.”* The Rev. Alfred Norman remarks, that it is abundant in the Clyde, and is very frequently entirely invested with a sponge.

INACHUS DORHYNCHUS, Leach. *Leach's Spider-Crab*.—Stomachal region with three points arranged in a triangle. Beak longer than in the last, divided by a fissure. Fore

* Zoologist, 3681.

legs of the male thick, not reaching beyond the penultimate joint of the second pair of legs.

This species seems to be pretty generally distributed on the coasts of England and Ireland. Mr. Eyton finds it off the Isle of Man, and the Rev. A. Norman describes it as not uncommon among the Channel Islands. Mr. Thompson, who finds it at Weymouth, describes the ova as large and of an orange-brown colour; the colour of the animal is dingy purple, brighter on the fore part of the carapace.

INACHUS LEPTOCHIRUS, Leach. *Slender-armed Spider Crab*.—Stomachal region with three spines placed triangularly. Fore legs of the male slender and reaching beyond the penultimate joint of second pair of legs. Sternum of the male furnished with a small oval polished tubercle.

First found by Mr. Cranch on the coast of Devon or Cornwall; it is found in Ireland. The Rev. G. Gordon ('Zoologist,' 3681) says that five specimens were taken from the stomach of a cod in the Moray Firth in 1849, and some were subsequently found in the Forth. The Rev. Alfred Norman found it not uncommon in forty fathoms, seven miles off Falmouth; he has taken also a fine specimen of the female in the Firth of Clyde.

FAM. *MAIADÆ*, *M. Edw.*

Legs of moderate size; the second and third pair never double the length of the postfrontal portion of carapace; first pair often longer and thicker than the following: basilar portion of outer antennæ much developed.

Gen. 4. *ARCTOPSIS*, *Lam.**

Carapace more or less triangular; the front elongated and armed with four horns directed forwards, the two central forming a kind of beak. Eyes with short peduncles, which can be reflected in the orbits. Outer antennæ with first joint narrow. Abdomen seven-jointed in both sexes. First pair of legs in male much longer than the others. Four hind pairs of legs with spines on the lower surface of the tarsi; second pair of legs much longer than the third.

ARCTOPSIS TETRAODON, Penn. sp. *Four-horned Spider Crab*.—Carapace a fourth longer than wide, posterior part regularly rounded, side with four strong spines; third and fourth joints of fore legs tubercular.

Carapace and greater part of legs covered with a dense coat of short hairs.

* Pisa, *Leach*.

Not a very common species. Mr. Bell finds it abundantly at Bognor, where "they are found concealed under the long hanging fuci which clothe the rocks at some distance from the shore," where they congregate in vast numbers in the prawn and lobster pots. "I have seen probably thirty amongst the refuse of one of these, attracted no doubt by the garbage which is placed in them as bait." Mr. Bell found the males to be larger than the females. Mr. Eyton obtained this at the Isle of Man, and the Rev. A. Norman at Guernsey and at Budleigh Salterton.

ARCTOPSIS LANATA, Lam. sp.* *Gibbs's Crab*. (Plate I. fig. 2.)—Hind part of carapace triangular, lateral margin without spines; branchial region on each side with a strong spine; the whole carapace covered with dense villous hairs much longer than in the last species.

South coast of Devon, Cornwall, and Sussex; Isle of Man (Mr. Eyton); Guernsey (Rev. A. Norman).

* *Cancer biaculeatus*, Montagu; *Pisa Gibbsii*, Leach; *Arctopsis lanata*, Lam. Syst. An. s. Vert. p. 155 (1801), an older name than either Montagu's or Leach's.

Gen. 5. HYAS, *Leach*.

Outer antennæ with the first joint of the movable stem flattened and widened on the outer side. Carapace wide, rather depressed. Legs much as in *Pisa*, only longer; the tarsus of the four hind pairs without spines on their lower surfaces.

HYAS ARANEUS, L. sp. *Great Spider Crab*.—Carapace narrowed in front, and without any distinct contraction behind the orbits.

Common on various parts of the coasts of Scotland, England, and Ireland. Dr. James Howden, for instance, says that it is frequently met with on sandy beaches, as at Musselburgh, in the salmon stake-nets, where it indulges its carnivorous propensities on the fish left dry by the tide.* Dr. Howden adds, that the *Hyas* feeds during the day, and seems to prefer its food a little high. Sir Robert Sibbald calls it the Harper Crab. It is very common in the Moray Firth, near low-water mark. Mr. Gordon says that the fishermen there call it “sea-tead,” that is *sea-load*.

HYAS COARCTATUS, Leach. *Contracted Crab*.—Carapace

* Proc. R. Phys. Soc. Edin., Jan. 1853.

widened in front, and then distinctly contracted or notched behind the outer orbital angles.

A small species widely distributed. Mr. Barlee found it in Shetland; and it occurs in most parts of the coasts of England, Ireland, and Scotland. The Rev. Alfred Norman has supplied me with the following note:—"Abundant, and very fine off the Isles of Arran and Cumbræ in the Firth of Clyde, and at Oban. It inhabits the coralline zone. This species varies very greatly in size in different localities. The following is a comparison of specimens taken at Sandgate, as given by Mr. Bell and others, from the Moray Firth, given me by Mr. Gordon, with these from Cumbræ.

	Sand- gate.	Moray Firth.		Cumbræ.	
		<i>Male.</i>	<i>Female.</i>	<i>Male.</i>	<i>Female.</i>
		<i>in. line.</i>	<i>in. line.</i>	<i>in. line.</i>	<i>in. line.</i>
Length of carapace	1 3	0 10	0 11	1 11	1 5
Breadth of ditto	0 9	0 6	0 7½	1 5	0 11
Length of first pair of legs . .	1 9	1 0½	1 0	3 3	1 8

I have likewise taken it at Falmouth. Mr. R. Couch informs me that it is not common on the Cornish coast, and that the specimens are always of small size there."

Gen. 6. MAIA, Lam.

Outer antennæ with the movable stem inserted within the inner canthus of the orbit, and exposed to view. Carapace oval, somewhat pointed in front; beak very strong, formed of two diverging horns; carapace, especially on the sides, with spines and tubercles. Front legs, even in the male, scarcely longer than the others, the fingers pointed at the end. Abdomen, in both sexes, of seven joints.

MAIA SQUINADO, Herbst. sp. *Thorn-back Crab*. (Plate II. fig. 1.)—Carapace of a roundish-oval form, covered with sharp spines; beak prominent, its two horns slightly diverging. Found abundantly on many parts of our coasts.

The Rev. Charles Kingsley* gives the following lively picture of the important services of this Crab as a remover of nuisances. "In the boat, silent and neglected, sat a fellow-passenger who was a greater adept at removing nuisances than the whole Board of Health put together; and who had done his work, too, with a cheapness unparalleled; for all his good deeds had not as yet cost the State one penny. True, he lived by his business; so do other inspectors of nuisances: but nature, instead of paying Maia Squinado,

* Glaucus; or, the Wonders of the Shore, pp. 133-135.



Sowerby del. et lith.

Vincent Brooks Imp.

1 *Maia Squinado*

2 *Eurynome aspera*.

3. *Xantho florida*.

Esquire, some five hundred pounds sterling per annum for his labour, had continued, with a sublime simplicity of economy which Mr. Hume might have envied, and admired afar off, to make him do his work gratis, by giving him the nuisances as his perquisites, and teaching him how to eat them. Certainly, (without going the length of the Caribs, who uphold cannibalism because, they say, it makes war cheap, and precludes entirely the need of a commissariat,) this cardinal virtue of cheapness ought to make Squinado an interesting object in the eyes of the present generation, especially as he was at that moment a true sanatory martyr, having, like many of his human fellow-workers, got into a fearful scrape by meddling with those existing interests and 'vested rights which are but vested wrongs,' which have proved fatal already to more than one Board of Health. For last night, as he was sitting quietly under a stone in four fathoms water, he became aware (whether by sight, smell, or that mysterious sixth sense, to us unknown, which seems to reside in his delicate feelers) of a palpable nuisance somewhere in the neighbourhood; and, like a trusty servant of the public, turned out of his bed instantly, and went in search; till he discovered, hanging among what he judged to be the stems of tangle (*Laminaria*), three or four large

pieces of stale thornback, of most evil savour, and highly prejudicial to the purity of the sea and the health of the neighbouring herrings. Happy Squinado! He needed not to discover the limits of his authority, to consult any lengthy Nuisances' Removal Act, with its clauses, and counter-clauses, and exceptions, and explanations of interpretations. Nature, who can afford to be arbitrary, because she is perfect, and to give her servants irresponsible powers, because she has trained them to their work, had bestowed on him and on his forefathers, as general health inspectors, those very summary powers of entrance and removal in the watery realms, for which common sense, public opinion, and private philanthropy are still entreating vainly in the terrestrial realms; so, finding a hole, in he went, and began to remove the nuisance, without 'waiting twenty-four hours,' 'laying an information,' 'serving a notice,' or any other vain delay. The evil was there,—and there it should not stay; so having neither cart nor barrow, he just began putting it into his stomach, and in the meanwhile set his assistants to work likewise. For suppose not, gentle reader, that Squinado went alone; in his train were more than a hundred thousand as good as he, each in his office, and as cheaply paid; who needed no cumbrous baggage train of

force-pumps, hose, chloride of lime packets, white-wash pails, or brushes, but were every man his own instrument; and to save expense of transit, just grew on Squinado's back. . . . There he sits, twiddling his feelers, (a substitute, it seems, with crustacea for biting their nails when they are puzzled,) and by no means lovely to look on in vulgar eyes; about the bigness of a man's fist; a round-bodied, spindle-shanked, crusty, prickly, dirty fellow, with a villanous squint, too, in those little bony eyes which never look for a moment both the same way. Never mind: many a man of genius is ungainly enough; and nature, if you will observe, as if to make up to him for his uncomeliness, has arrayed him as Solomon in all his glory never was arrayed, and so fulfilled one of the few rational proposals of old Fourier, that scavengers, chimney-sweeps, and other workers in disgusting employments, should be rewarded for their self-sacrifice in behalf of the public weal by some peculiar badge of honour or laurel crown." Mr. Kingsley then proceeds to give a graphic picture of the corallines, etc., growing on the back of the crab, the polypes in which live on the tiny atoms of decaying matter (*Campanularia*, *Crisida*, *Coryne*), etc.

Mr. Gosse observed at Ilfracombe, in 1852, the sloughing

of a large Spider Crab,* which had retired to a crevice and was resting there, face outwards. The old carapace was completely covered with parasitical zoophytes and algæ. When securing it, he felt the body fall away from the carapace, and on looking at the Crab, he saw the new carapace perfectly formed and coloured, with no marks of injury where the slough had parted from it; the limbs and the under parts still remained invested. After being some time out of the water, as he carried it home, he covered it with its native element, when it seemed very inert and exhausted. In a short time he observed the whole of the limbs, the abdominal segments, the sternum, and all the parts of the mouth to come off entire, being connected by the common integuments. He observed the hind legs were freed first, and the animal pulled the front pairs out, first tugging at one and then at another, as if from boots. Mr. Gosse observed that the joints, as they came out, were a great deal larger than the cases from which they proceeded. The parts had a jelly-like softness when extruded, and seemed to be compressed as they were liberated, by the fluids being forced back, and returning through their vessels, they distended the freed portion of the limb. The branchiæ

* Ann. and Mag. N. Hist. 1852. X. n. s. p. 210.

were beautifully represented in the exuviae; the teeth on the edges of the claws closed accurately on each other in the renewed crab, although there was scarcely a trace of them distinguishable in the slough, the teeth having been probably worn smooth by use. Mr. Gosse did not observe "any of the struggling that is sometimes spoken of; it seemed to be a very easy and simple matter. The new integuments were perfected, though soft, before the old were thrown off, and the immediate cause of the separation of the crust appears to be the sudden growth of the animal within, forcing asunder the upper and lower crusts at the posterior margin; then the pulling out of the limbs presents no more difficulty than what depends on the enfeebled condition of the muscular energy."

FAM. *PARTHENOPIDÆ*, *M. Edw.*

Four hind pairs of legs much shorter than the fore legs. First pair large; in the male, and sometimes in both sexes, very much longer than the others. Basilar joint of the outer antennæ almost always slightly developed, not united to the front. Carapace more or less triangular.

A family very feebly represented in the British seas. In the seas of warmer climates there are many fine species.

The large *Parthenope*, from which the family name is derived, looks like a piece of rock, corroded by the action of the waves.

Gen. 7. EURYNOME, *Leach*.

Eyes retractile; hands more or less triangular, and armed with teeth. Carapace covered with asperities. Beak horizontal, and divided into two triangular horns. Outer antennæ with the first joint ending at the inner angle of the orbit, the next joint springing from its upper edge, so that the movable stem, which is prolonged under the beak, seems to spring from the inner canthus of the eyes. Abdomen in both sexes of seven joints.

EURYNOME ASPERA. *Strawberry Crab*. (Plate II. fig. 2.)
—Of a rosy colour with bluish tints, rugose, with a large triangular tooth at the outer angle of the orbit, and three or four smaller ones along the side margin on the branchial region. Anterior legs tubercular, slightly compressed, nearly straight in the female: the other legs rugose, and furnished with a crest which is most distinct on the third joint.

Found in deep water, though not very commonly, on various parts of the coast. The Rev. G. Gordon found it at Lossie Mouth, in the Moray Firth. Dr. James Howden

in the Firth of Forth, off Prestonpans and Port Seaton, where it is often incrusted with minute algæ and mud, so as to be easily overlooked. Mr. M'Andrew dredged it in Loch Fyne. On the south coast of England it is met with in several places, and also on the Irish coast, as in Belfast Bay and elsewhere. The Rev. Alfred Norman remarks that it is always found on hard ground and in deep water: he finds it abundantly in the Firth of Clyde and at Oban.

This is sometimes called the Strawberry Crab, from its being covered over with pink tubercles on a white ground, so that it has some resemblance to the fruit whence the name is derived. These tubercles consist of short cylindrical columns, truncated at the end, and terminating in polished red or white hemispherical knobs. Mr. Gosse, in his 'Aquarium,' p. 137, has given an account of its habits. He remarks:—"The Strawberry Crab is a *climber*. If it were a terrestrial animal, I should say its habits are *arbo-real*. True, it now and then wanders over the bottom of its abode, with slow and painful march, the hind feet held up at an angle above the level of the back; but generally it seeks an elevated position. We usually see it in the morning perched on the summit of some one of the more bushy weeds in the Aquarium, as the *Chondrus* or *Phyllophora*

rubens, where it has taken its station during the night, the season of its chief activity, as of most other Crustacea. It interested me much to see it climb; seizing the twigs above it by stretching out its long arms alternately, it dragged up its body from branch to branch, mounting to the top of the plant deliberately, but with ease. While watching it I was strongly reminded of the Orang-utan at the Zoological Gardens; the manner in which each of these very dissimilar animals performed the same feat was so closely alike, as to create an agreeable feeling of surprise. This circumstance led me to think of another; the resemblance was not only in habit, but in conformation also, viz. in the great length of arm. This is obviously an adaptation for climbing in the Quadrumane as well as the Crustacean; and a few examples occurred to my remembrance in which a similar structure is associated with the like habit. All the Monkey tribe, for instance, and the Sloths of South America, which are almost exclusively arboreal, have the anterior limbs excessively long. Many of the Longicorns among Beetles are remarkable for their developed arms, and these are essentially tree insects. Again, among the Spiders, the perpendicular web-makers, as *Epeira*, *Tetragnatha*, etc., which run to and fro on the tracery of their slender lines, like sea-

men manning the shrouds on a fleet gala-day—have the anterior legs much elongated.”

Its eggs are of a bright red transparent coral-colour. The young has the beak spiny on the outside, the sides of the carapace have only two lamellæ, and the abdomen is tuberculated. Mr. Hailstone has described it in this state as a distinct species, under the name of *E. spinosa*.

Tribe 2. CYCLOMETOPITA,* *M. Edw.*

Carapace very wide, and regularly arcuated in front; contracted behind.

Some of the species are essentially organized for swimming, and are found on the open sea; others live near the coast, but never quit the water; some live as long out of the water as in it; while others dig in the sand a subterranean cave, into which they retreat. (*M. Edw. l. c., i. 367.*)

FAM. *CANCERIDÆ*, *M. Edw.*

Carapace wider than long, narrowed somewhat behind, the frontal sides forming a segment of a circle. Legs not adapted for swimming; the hind ones similar to the others, and ending in a pointed, claw-like toe.

* *Κυκλος*, a circle; *μετωπον*, front.

This is an extensive family, though there are but few species found in this country. One of these however is called THE CRAB *par excellence*, and is highly esteemed as food. The crust of most of these *Canceridae* is very strong and hard.

Gen. 8. XANTHO, *Leach*.

Carapace wide, back somewhat flattened, the hind legs more or less compressed. Latero-anterior margins of carapace about the same length as the posterior part, with three or four strong teeth; abdomen with seven joints in the female, and only five in the male. Movable stem of outer antennæ springing from the inner angle of orbit, inner antennæ transversely folded.

XANTHO FLORIDA, Mont. sp. *Montagu's Crab*. (Plate II. fig. 3.)—Fingers black, rounded, and without the slightest trace of grooves. Fore legs swollen and large, the following short, furnished with hairs on the upper margin of the third joint. Carapace reddish-brown, the claws black.

Found abundantly on the coasts of Cornwall, and less frequently on those of Devonshire and Dorsetshire; and also on several parts of the Irish coast. Mr. Gosse finds that with its flat back, when kept in an Aquarium, it causes great disorder, by turning over the stones, even when of considerable size.

XANTHO RIVULOSA, Risso, sp. *Risso's Crab*.—Fingers grooved, brown, the bosses on the carapace more depressed than in the preceding. Four last pairs of legs furnished with hairs along their upper margin. Carapace yellowish, spotted with red.

Common on the coast of Cornwall, under stones about low-water mark, where it was first ascertained to be British by Mr. Couch.

XANTHO TUBERCULATA, Bell.—The carapace slightly depressed in front; hands and wrists tuberculated, rugose; fingers nearly black, the movable one with three grooves; third joint of the four last pairs of legs minutely toothed on the upper edge, the three terminal joints covered entirely with hair.

Found by Mr. Couch in Mount's Bay, whence he first sent it to Professor Bell, who described and figured it in his classical work.

Gen. 9. CANCER, L.

Sides of carapace in front with many teeth or lobes placed close together. Movable stem of outer antennæ springing from under the front, and completely out of the orbit, from which it is separated by a prolongation of the basilar joint

of these appendages, which is united with the front. Inner antennæ longitudinally folded.

CANCER PAGURUS, L. *Common Crab*.—Carapace granulated above, latero-anterior margin nine-lobed, the lobes close to each other and entire.

Generally distributed on our coasts. In Scotland it is called “Parten.”

Couch* says that in Cornwall the female is called “Bon-Crab,” and begins to breed when about three inches across the carapace. Among the multitudes of young found beneath stones at low-water mark, Mr. Couch has never seen a female. The male is called in Cornwall the “Stool Crab,” and not uncommonly weighs twelve pounds, whilst the female is rarely of half that size. Mr. Couch says, “Although this crab is somewhat affected by cold weather, so that it is most abundantly caught in summer, its activity is not diminished by it, and some may be obtained at all seasons. The fishery, therefore, is more influenced by the danger to which the pots, set to take them, are exposed in stormy weather, than by the absolute scarcity of the crabs. Their haunts are along the edges of rocks, in situations varying from low-water mark to about twenty fathoms; and the

* Cornish Fauna, p. 68.

selection is perhaps as much influenced by the facility of hiding or burrowing as by the supply of food."

From Mr. Gosse's 'Naturalist's Rambles on the Devonshire Coast,' p. 174, the following extract, of "A Crab at home," is derived. "At the water's edge, at the outer base of the Capstone, at low-water spring tide, I was looking about for Actinias, when peering into a hole I saw a fine Crab, not of the very largest, but still of very nice table dimensions. I poked in my arm and took hold of him; and though he made vigorous efforts to hold fast the angles and notches of his cave with his sharp toes, I pulled him out and carried him home. I noticed that there came out with him the claw of a crab of a similar size, but quite soft, which I supposed might have been either carried in there by my gentleman to eat, or accidentally washed in. After I had got him out, for it was a male, I looked in and saw another at the bottom of the hole, which appeared to me considerably smaller. I debated whether I should essay this one also, but reflected that I could only eat one at a supper, and that moderation in luxuries is becoming; 'so,' said I, 'friend Crab, stay there till next time; I may find you here again on some other auspicious morning.' When I arrived at home, however, I discovered that I had

left my pocket-knife at the mouth of the crab-hole. I felt loath to part with my old knife, and therefore at once put on my hat, running hard, for fear the tide, which had already turned, might be too high. I got to the place however just in time, found my knife, and then took another peep at the crab: it had not moved, and thinking that if I could not eat it myself I might ask my neighbour's acceptance of it, I drew it out with my fingers, as I had done with the former. But lo! it was a soft Crab, the shell being of the consistency of wet parchment, and the colours (all except those of the carapace) being pale. It was a female too, without any sign of spawn, and had lost one claw; strange, that I had not thought of connecting the soft claw that I had drawn out before with this crab that I saw at the bottom; but I carefully put the helpless creature into the hole again, and saw that it settled its legs and body comfortably in its old quarters, and there I left it; for our crab is worthless for the table in this condition, unlike the Land Crabs of the West Indies, which are esteemed peculiarly delicate in their soft state. What then are we to infer from this association? Do the common Crabs live in pairs? and does one keep guard at the mouth of their cavern while its consort is undergoing its change of skin? If this is the case, it is a

pretty trait of cancerine character, and one not unworthy of their acute instinct and sagacity in other respects. The male displayed no appearance of the moult, its coat being of a shelly hardness. I have no doubt that the claw of its mate was unintentionally torn off, in its efforts to grasp some hold, when resisting my tugs in dragging him out."

Gen. 10. PILUMNUS, *Leach*.

Carapace convex above, and more or less covered with longish hairs. Outer antennæ with the first joint small; second joint nearly as long as the first, lodged in the inner orbital canthus, and extending beyond the front. Four hind pairs of legs hairy. Abdomen in both sexes of seven joints.

PILUMNUS HIRTELLUS, Linn. sp. *Hairy Crab*.—Latero-anterior margins of carapace, with four spines placed on the same line; front divided by a deep fissure down the middle. Fore legs unequal in size. The colour of this Crab is brownish-red, with dull yellow spots. The legs are banded with a dull yellowish colour.

Found on the southern and western coasts of England, and also on the Irish coasts. On the South Devon coast the Rev. Alfred Norman finds it in fifteen fathoms.

Gen. 11. PIRIMELA, *Leach*.

Carapace nearly as long as broad. Outer jaw-feet with the third joint having the fourth inserted by its inner edge, and prolonged much beyond it over the epistome. Abdomen of the female of seven joints, of the male formed of five.

PIRIMELA DENTICULATA, Mont. sp. *Toothed Pirimela*. (Plate III. fig. 1.)—Carapace smooth, strongly bossed on the stomachal, genital, and branchial regions; concave on the hepatic regions; latero-anterior margins on each side, with four or five strong flattened teeth. Hands furnished with a slight crest above, and one or two grooved lines on their outer face.

Not a very abundant species. It is found on the south coast of England; Mr. Norman says it is apparently not uncommon among weeds at extreme low-water mark in Guernsey and Herm. It has been found also on the coasts of Scotland and Ireland.

FAM. PORTUNIDÆ, *Leach*.

In these the last pair of feet are much flattened out side-wise, and the toe in particular is dilated into an oval, thin-edged plate, which, striking obliquely upon the water, acts



Sowthby del & lith.

Vincent Brooks Imp.

1. *Pirimela denticulata*.

2. *Polybius Henslowii*.

3. *Portunus puber*.

as an oar, with that peculiar action which is known to boatmen as sculling. . . . "None of our native Crabs are 'at the top of the tree' in the swimming profession. Their efforts, even those of the best of them, are awkward bunnings, when compared with the freedom and fleetness of those I have seen in the Caribbean Sea, and among the gulf-weed in the tropical Atlantic, which shoot through the water almost like a fish, with the feet on the side that happens to be the front all tucked close up, and those on the opposite side stretched away behind, so as to 'hold no water,' as a seaman would say, and thus offer no impediment to the way. Our species are obliged to keep their pair of sculls continually working while they swim; a series of laborious efforts just sufficient to counteract the force of gravity; and the seesaw motion of the bent and flattened joints of the oar-feet is so much like that of a fiddler's elbow, as to have given rise to a very widely-adopted appellation of these Crabs, among our marine populace."*

Gen. 12. CARCINUS,† *Leach*.

Carapace nearly as long as wide, the front projecting;

* Gosse, Aquarium, p. 195.

† *Kapivios*, a Crab. Mr. Dana places the genera *Carcinus*, *Portunus*, and

latero-anterior teeth five. Eye-peduncles short. Tarsi of hind legs very narrow and lance-shaped.

CARCINUS MÆNAS, Linn. sp. *Common Shore Crab*.—When alive, greenish; carapace slightly granular in front; front ending in three rounded lobes; inner edge of wrist with a strong spine.

The most common species on our coasts. It is very voracious. Dr. James Howden refers to this Crab and the *C. Pagurus*, as being often very injurious to the salmon-fisher. He has seen trout and mackerel reduced to skeletons in a very short time, and grilse and salmon often rendered unfit for market by an unseemly scar, the work of these marauders. In the Moray Firth, according to the Rev. G. Gordon, it is occasionally employed as bait; particularly the “peelarts,” or those specimens which have just cast their shells.* An anomalous parasite, named *Sacculina Carcini*, is found on this Crab: it is apparently destitute of the organs of mastication.†

Polybius in a distinct family from *Portunus*, which he names *Platyonychidæ*, after its characteristic genus, *Platyonychus*.

* Zoologist, p. 3682.

† J. V. Thompson, Ent. Mag. iii. 452.

Gen. 13. PORTUMNUS, *Leach*.

Tarsus of hind legs very wide, lanceolate. Carapace longer than wide, and much contracted behind; front with one of the teeth on the middle line; a single fissure on the upper orbital margin. Abdomen of male with five segments. Tarsus of second, third, and fourth pairs of legs narrow and not adapted for swimming.

PORTUMNUS LATIPES, Penn. sp. *Pennant's Swimming Crab*.—Carapace with the latero-anterior margins furnished with very small teeth; front legs short. It is of a dull purplish-white, mottled with a darker hue. Found on the south and west coasts of England and on the Irish coasts. In Scotland it has been found on the shores of the Firth of Forth and of the Moray Firth. The Rev. G. Gordon remarks that it seems never to move so far from the land as to become the prey of any of the more rapacious fish.

Gen. 14. POLYBIUS, *Leach*.

Carapace nearly circular, the legs all flattened; the tarsi of second, third, and fourth legs wide and lanceolate, those of the fifth oval.

The Rev. Alfred Norman informs me that he has seen

the sandy beach between Hayle and St. Ives quite strewn with their exuviae, and he was informed by Mr. R. Couch that the *Polybius* is gregarious, swimming in shoals, and thus occasionally occurring in great numbers on the south coast of Cornwall.

POLYBIUS HENSLOWII. *Henslow's Swimming Crab*. (Plate III. fig. 2.)—Carapace quite smooth and flat above. Body very depressed; front with five triangular teeth.

First obtained by Professor Henslow on the north coast of Devon, and subsequently found in various parts of the southern coast of England. It was named by Dr. Leach after the learned naturalist who first discovered it.

This is named Nipper Crab by the Cornish fishermen. Mr. J. Couch, in his 'Cornish Fauna,'* observes that this is more a swimming crab than any of the others; "for whilst the other British species of this family are only able to shoot themselves along from one low promontory to another, the Nipper Crab mounts to the surface over the deepest water in pursuit of its prey, among which are numbered the most active fishes, as the mackerel and Rauning pollack (*Merlangus carbonarius*), the skin of which it pierces with its sharp pincers, keeping its hold until the terrified victim becomes exhausted. We are witnesses of this curious method of

* Part I. p. 71.

obtaining food in the summer only, at which season the fishermen's nets intercept them and their prey together; and it is probable that in colder weather they keep at the bottom in deep water; from which however I have never seen them brought in the stomachs of fishes. So far as my observation extends, it is chiefly or only the male that pursues this actively predaceous existence; but that for a time they also remain quietly at the bottom appears from the fact, that while for the most part the smooth and flattened carapace is clean, I have seen it covered with small coralines (*Sertulariæ*)."

Gen. 15. PORTUNUS, *Fabr.*

Carapace broader than long; front narrow, projecting. Outer antennæ inserted on the same line as the eyes and the inner antennæ, their basilar joint united to the front, and completely separating the orbit from the antennary fossette. The tarsus of the second, third, and fourth pairs of legs elongated, narrow, pointed, and grooved; tarsus of the hind legs very wide, oval. Abdomen of male triangular.

Mr. Gosse found the young of a species of *Portunus* on the Devonshire coast. They were about one-fifth of an inch in length, and had assumed much of the form of a crab,

having passed from their state of *Zoea* to "that secondary condition known as *Megalopa*." He thus describes some specimens which he caught and placed in a vase. Their abdomen projected like a long slender tail behind, and was armed at the end with fine radiating pencils of hairs. "The eyes, which were very large, projected on each side, being set on thick footstalks; and as they were of a brilliant green hue, and very lustrous, they formed a conspicuous feature of the little animals. They manifested a sensibility to light correspondent to this development. At night they congregated on that side of their glass prison which was next the candle; and when I transferred the light to the opposite side, they immediately scuttled across and crowded up as close to it as possible. They would follow the candle round and round the glass, shifting as it shifted, and stopping when it stopped. They were very nimble in swimming, generally keeping near the surface."* They died off very fast, but not before one or two underwent their change, which Mr. Gosse was able to recognize as that of *Portunus*.

PORTUNUS PUBER, Linn. sp. *Velvet Crab*. (Plate III. fig. 3.)—Front armed at least with ten teeth or spines; carapace densely covered with hairs; front legs of moderate size, and

* Aquarium, p. 157.

covered, as well as the following, with a dense pile, interrupted by raised longitudinal lines, which are granular on the hands and smooth on the hind legs.

Not uncommon on the south-west coast of England, and on the Irish coast. In Scotland the Rev. G. Harris has taken it in the Moray Firth. Mr. Norman says that it is eaten and considered a great delicacy in the Channel Islands, where it is known as the *Lady Crab*. That gentleman says that hundreds of them may frequently be seen on the shore, the refuse of the lobster pots; and he has likewise frequently taken it under stones at low water off Tenby, and in the Firth of Clyde.

From Mr. Gosse's 'Aquarium' (p. 195) we derive the following description:—"An old male of the Velvet Fiddler is a striking and handsome Crab. His body generally is clothed with a short velvety pile of a pale brown or drab hue, from beneath which here and there shines out the glossy deep black shell, especially where rubbed, as at the edges. The feet, particularly the plates of the oars, are conspicuously striped with black; the large and formidable claws are marked with bright scarlet and azure, as are also the foot-jaws and face, while the eyes are of the richest vermillion, projecting from hollow black sockets." This species,

when apprehensive of assault, uses its powerful claws "to strike transversely, as a mower uses his scythe." A specimen which Mr. Gosse kept he found to be shy and recluse. "He at once slid into the most obscure recess he could find, beneath the dark shadow of two pieces of rock that formed an arch. For some days he remained gloomily in his new castle; but at length he ventured out, under the cover of night, and would wander about the floor of the tank. But he never lost his cautious suspicion, and the approach of the candle was usually the signal for a rush back to his dark retreat. He was a fit representative of one of those giants that nursery tradition tells of, as infesting Cambria and Cornwall, 'in good King Arthur's days.' Gloomy and grim, strong, ferocious, crafty, and cruel, he would squat in his obscure lair, watching for the unsuspecting tenants of the tank to stray near, or would now and again rush out, and seize them with fatal force and precision. As the Giants Grim of old spared not ordinary-sized men for any sympathy of race, so our giant Crab had no respect for lesser Crabs, except a taste for their flesh. I had two or three full-grown Soldier Crabs; themselves warriors of no mean prowess; two, at least, of these fell a prey to the fierce Fiddler. His manner of proceeding was regular and

methodical. Grasping the unthinking Soldier by the thorax, and crushing it so as to paralyze the creature, he dragged the body out of the protecting shell. The soft, plump abdomen was the *bonne bouche*; this was torn off and eaten with gusto, while the rest of the animal was wrenched limb from limb with savage wantonness, and the fragments scattered in front of his cave."

PORTUNUS HOLSATUS, Fabr.—Front with three small teeth. Carapace much depressed, minutely granulated. Hind legs with tarsus rounded at the end.—Found on various parts of the coast: Sandgate, Firth of Forth.

PORTUNUS CORRUGATUS, Penn. sp. *Wrinkled Swimming Crab*.—Carapace convex, and covered with transverse granular lines, which have hairs inserted on them. Front projecting, and divided into three lobes, of which the middle projects beyond the lateral lobes. Sides of carapace with five teeth, very sharp and nearly equal.

Not a common species. First found on the shores of the Isle of Skye: it occurs also in Plymouth Sound. The Rev. Alfred Norman has taken it, but rarely, in Cornwall.

PORTUNUS LONGIPES, Risso.—Front wide, projecting, entire or slightly four-lobed. Legs very slender and very long; second pair of legs longer than the first pair, and

very much shorter than the third pair. Carapace with the latero-anterior margins short.

Cornwall (Mr. Cocks); off Falmouth in deep water (Rev. A. Norman); Oxwich Bay near Sandwich, and Mount's Bay (Mr. Bate).*

PORTUNUS PLICATUS, Risso.—Front with three strong triangular teeth; carapace with the surface unequal, somewhat granular, and covered with hairs, considerably narrowed behind.

A common species on many parts of our coasts as far north as the Moray Firth. This species and the next are called in Cornwall, Harbour or Mary Crabs; they are very ravenous, and fasten eagerly on any animal substance that comes within their reach. (Couch, 'Cornish Fauna,' p. 72.)

PORTUNUS MARMOREUS, Leach. *Marbled Fin Crab*.—Front with three small blunt teeth; carapace very slightly granulated, without hair, symmetrically marked with buff and brownish-red. Hind legs with the tarsus pointed at the ends.

Not uncommon on our coast. Mr. Bell remarks that "the colours of this species are exceedingly varied and

* This has been described by Mr. Spence Bate as the *Portunus Dalyelli*. Ann. Nat. Hist. 2nd ser. vii. 321.

beautiful, particularly in the males. Buff, light brown, deeper brown, and brownish-red, are arranged over the carapace in varied but always exactly symmetrical patterns. The only way in which these beautiful markings can be preserved is, by raising the carapace, taking out the soft parts, and drying the specimens in a shady place in a brisk current of air." At Sandgate, in May 1844, Mr. Bell procured nearly four hundred specimens of this species at two casts of the dredge; and he remarks that "it is very curious to observe how local these *cleansers* are. In the former year, at Bognor, I found multitudes of *Portunus Rondeletii*, which absolutely swarmed in the Prawn and Lobster-pots; but not a specimen of any other species was obtained there. The place of these is supplied at Sandgate by the present species, whilst farther to the west *P. puber* and *P. depurator* appear to occupy the ground, and perform the same important office of scavengers of the sea."*

PORTUNUS PUSILLUS, Leach. *Dwarf Fin Crab*.—Carapace very convex and bossed, without hairs; front projecting much, divided into three lobes, central one projecting beyond the side one; hind legs with the tarsus lanceolate.

Hab. British coast, from Shetland to Cornwall. In the

* British Crustacea, p. 106.

Moray Firth and the Firth of Forth it is very common, and also in the Firth of Clyde (Rev. A. Norman).

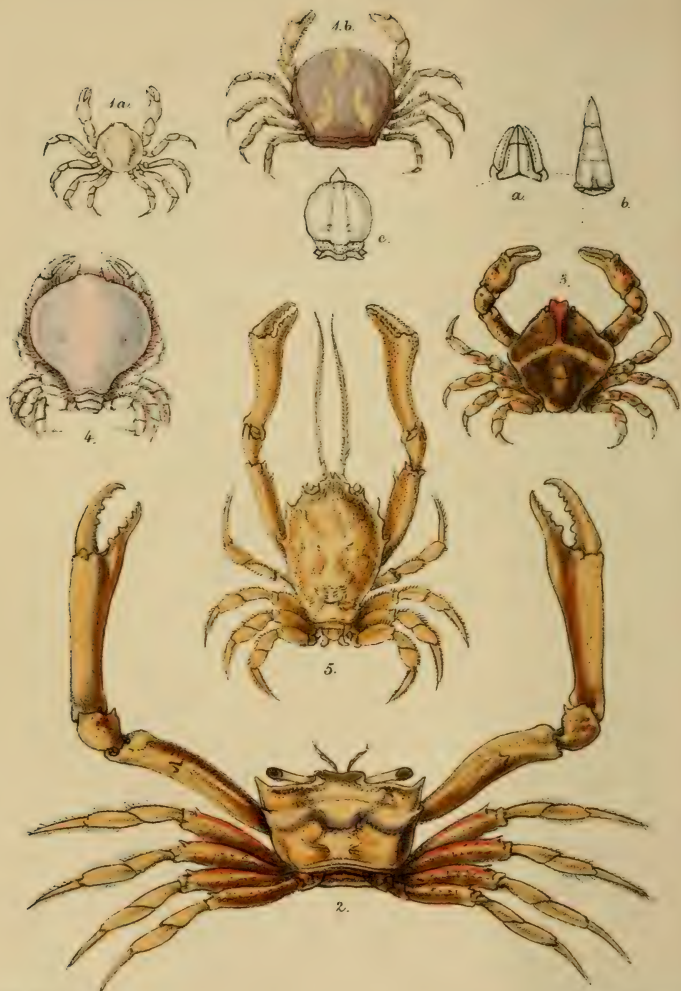
PORTUNUS ARCUATUS, Leach.—Front of carapace entire, or very slightly two-lobed; second pair of legs shorter than the first pair, and nearly as long as the third pair. Carapace granular, the penultimate lateral tooth much smaller than the others.

Generally distributed on the coast. Mr. Bell says that its habits are very similar to those of the other species of the genus; "they are active, bold, swimming with agility, and seizing with great sharpness and pinching severely with their acute claws. They are gregarious, like most of their congeners; and I found them extremely abundant at Bognor, where they constantly infest the prawn-pots, and, as the fishermen believe, keep the prawns from the bait."* The Rev. Alfred Norman remarks that this species is abundant in Falmouth harbour, in four fathoms; he finds it in the Firth of Clyde, in the coralline zone.

Tribe 3. CATOMETOPITA, *M. Edw.*

Carapace generally quadrilateral or ovate, with the front nearly straight. Eyes often on long pedicels.

* British Crustacea, p. 99.



Sowbby del. et lith.

Vincent Brooks imp.

1. *Pinnotheres pisum*. a. male. b. fem.

2. *Gonoplax angulata*.

3. *Ebaha tuberosa*. 4. *Thia polita*.

5. *Cerastes Cassivelaunus*.

Some of the species live inside bivalve shells, but the greater number live free. Some of the exotic species, such as the Land Crabs of the West Indies, only visit the sea to hatch their eggs; others, as the species of *Ocypode*, can run with great agility.

FAM. PINNOTHERIDÆ, *Leach*.

Carapace circular, at least as long as wide. Abdomen of the male with the second joint much narrower than the corresponding part of the sternal shield. Front generally very narrow. Eye-stalks very short. Fourth joint of outer jaw-feet fixed at the top or outer angle of the third joint.

The species of this family are of small size, and they live parasitically within the lobes of the mantle of bivalve shells. The females are much larger and much more soft than their mates.

Gen. 16. PINNOTHERES, *Latr*.

Front wide enough to conceal beneath it the inner antennæ. The outer jaw-feet, when closed, semilunar in front, very wide behind; the inner antennæ transverse. Carapace and body circular, and rounded above. Abdomen of male very small; of female much swollen and wider than the sternal shield.

Although the species of this family are very small, and of themselves would form but a small addition to the food of man, yet they are, in some places where they abound, eaten along with the testacea on which they are parasitic. Mr. Say, after his description of a species found in the common American oyster (*Ostrea Virginica*), adds, that those who are fond of oysters seldom reject the Pea Crab, and that in the States, in those places where the fresh oyster is opened in considerable numbers, the little Crabs, though only seventieths of an inch long by two-fifths wide, are often collected apart and served up to gratify the palate of the gourmand.*

PINNOTHERES PISUM, Penn. sp. *Common Pea Crab*. (Plate IV. fig. 1.)—Carapace soft. Front prominent in the male, not extending beyond the bent line formed by the front part in the female. Lower edge of the hands fringed with hairs. Abdomen of female circular.

Commonly found in the common Mussel, and sometimes in the common Cockle, but rarely in the Oyster; the female (fig. *b*) is much more common than the male (fig. *a*). Mr. Bell describes the male as being variable in colour. It is generally of a pale yellowish-grey, with somewhat darker

* Journ. Acad. Sc. Phil. i. 68.

symmetrical markings. The female is generally somewhat transparent, brown above, with a yellow spot over the front and an irregular one on each branchial region; the abdomen yellow, with a large central triangular brown spot.

PINNOTHERES VETERUM, Bosc. *Pinna Pea Crab*.—The lower margin of right hand in the female furnished with a small spine. Abdomen of female generally oval; in the male the carapace has the front slightly notched.

Devonshire and Ireland, in the *Pinna ingens* and in *Modioli*, and also the common Oyster.

Both male and female are brown. This is the species found in the Mediterranean, and whose history, mingled with much fable, is recorded by some of the ancient authors.

In the poet Oppian* the story of the *Pinnotheres* is recorded according to the ancient belief of its life and manners. We quote the translation of this story given by Pennant.

“ In clouded deeps below the *Pinna* hides,
And through the silent paths obscurely glides;
A stupid wretch, and void of thoughtful care,
He forms no bait, nor lays the tempting snare;
But the dull sluggard boasts a *Crab* his friend,
Whose busy eyes the coming prey attend :

* Halicut., lib. ii., quoted by Pennant, Brit. Zool. iv. p. 2.

One room contains them, and the partners dwell
Beneath the convex of one sloping shell ;
Deep in the wat'ry vast the comrades rove,
And mutual interest binds their mutual love ;
That wiser friend the lucky juncture tells,
When in the gaping circuit of his shells
Fish wandering enter ; then the bearded guide
Warns the dull mate, and pricks his tender side ;
He knows the hint, nor at the treatment grieves,
But hugs th' advantage and the pain forgives ;
His closing shells the *Pinna* sudden joins,
And 'twixt the pressing sides the prey confines.
Thus fed by mutual aid, the friendly pair
Divide their gains, and all the plunder share."

FAM. *GONOPLACIDÆ*, *M. Edw.*

Carapace rhomboidal, its front margin and sides forming continuous lines. Front very wide, occupying generally a third of the length of fore margin. Outer antennæ horizontal, and lodged beneath the front. Eye-stalks very long. Abdomen of male with second joint narrower than corresponding portion of sternal plate.

The species of this family appear to be restricted to the seas of the Old World ; but one species is found in our seas ; this however is a well-marked member of the family.

Gen. 17. GONOPLAX, *Leach*.

Eye-stalks very long. Carapace much wider than long. Front legs of the adult male nearly five times the length of the carapace; in female about twice the length of carapace. Abdomen of male with seven distinct joints, as in the female.

The Mediterranean species, which is allied to ours, was observed by Risso to swim with great ease, and often to come to the surface of the water, without however ever leaving it. It feeds on small fishes and radiated animals.

GONOPLAX ANGULATA, Penn. sp. *Angular Crab*. (Plate IV. fig. 2.)—Carapace armed on each side with two small spines directed forwards. Arm cylindrical, spined about the middle of its upper edge, the wrist with two spines.

Coast of Devon and Cornwall. In the latter county, according to Mr. Couch, it is common in moderately deep water, and often in the stomachs of fishes. It has been taken on the Irish coast. Mr. Cranch observes* that these Crabs live in excavations formed in the hardened mud, and that their habitations, at the extremities of which they live, are open at each end. The fore legs of the adult male are nearly five times the length of the carapace; but in younger

* Leach, Mal. Pod. Brit. t. 13.

specimens they are not much longer than those of the females, in which they are about twice the length of the shell.

FAM. *GRAPSIDÆ*, Bell.

Carapace square. Eye-stalks very short. Front very wide, occupying nearly half of the fore margin of the carapace. Abdomen of male with the second joint nearly as wide as corresponding part of breast, and reaching nearly to the base of hind legs.

A most widely distributed family, containing a great number of species chiefly found in the warmer parts of the globe. The species here recorded can only be considered as an accidental visitor.

Mr. Macleay, in the first volume of the 'Transactions of the Zoological Society,'* alludes to two species of this family as characteristic objects in "the general appearance of a sandy seashore in the island of Cuba; . . . when every object to the dazzled eye seems quivering under the broiling sun," the *Goniopsis ruricola* and *Grapsus pictus* may be seen running over the seaweed that has been left by the tide. The former of these usually inhabits the muddy mouths of rivers or mangrove marshes in bays, while the *Grapsus* fre-

* Vol. i. p. 184.

quents an open sandy or rocky coast. Both the species are exceedingly suspicious and active, the *Grapsus* on being alarmed running swiftly for shelter to the sea, while the *Goniopsis* makes for the holes which it forms in the mud.

Gen. 18. PLANES, *Leach*.

Carapace longer than wide. Front projecting and simply inclined. Tarsi thick and spined. The species of this genus are found amongst the Gulf-weed (*Sargassum natans*), which seems to be their natural haunt; so that the occurrence of these crabs on our coasts is a mere accident.

PLANES LINNÆANA. *Floating Crab*.—Carapace smooth; behind the outer orbital angle there is a small tooth, more or less marked.

Occasionally washed up on the shores of Devonshire and Cornwall. This is a common Crab among the Gulf-weed, and may have been the species pointed out to his somewhat mutinous companions by the greatest of navigators, as an indication that they were not very far from land; a sign by which he contrived to keep up their spirits, disheartened by long sailing over an ocean apparently without a shore in the direction their ships were making. Milne-Edwards has named this genus *Nautilograpsus*. The spe-

cies of the allied genus *Brachynotus* is found in the Mediterranean; it has been found under the tail of the *Testudo Midas*, or Turtle.

Tribe 4. OXYSTOMATA.

FAM. *LEUCOSIADÆ*, *Leach*.

Carapace more or less circular in general outline; the outer jaw-feet, when closed, triangular, and sharp-pointed in front (Plate IV. fig. 3 *a*). No branchial openings before the front legs; outer antennæ rudimentary.

This family and the following belong to the tribe OXYSTOMATA, or Pointed-mouthed Crabs, so called from most of the Crustacea included in it having the mouth-apparatus triangular, the front portion being narrow and pointed. The family *Leucosiadæ* has been lately monographed by the able hand of Professor Bell, in the 'Linnean Transactions.' The family is very feebly represented in our seas; many of the exotic species and genera are very striking and peculiar Crabs.

Gen. 19. EBALIA, *Leach*.

Carapace knobbed, its sides slightly dilated, its general form rhomboidal; outer jaw-feet with the palpus not dilated

on the side. Abdomen seven-jointed, some of the joints confluent; in the male narrow (Plate IV. *b*), in the female broad (Plate IV. *c*), the last joint very small, and imbedded between the base of the foot-jaws.

EBALIA TUBEROSA,* Penn. sp. Plate IV. fig. 3. *Pennant's Nut Crab*.—The latero-anterior edge of carapace divided into two lobes by a fissure; carapace raised, with a blunt crest and three branches, the front on the median line of stomachal region, and the two others on the branchial regions.

Found on various parts of our coast as far north as Shetland, where it was procured by Mr. Barlee.† The Rev. Alfred Norman has found it occasionally in Devon and Cornwall, and remarks that it is “abundant and fine in fifteen fathoms on hard ground in the Firth of Clyde.”

Mr. Gosse in his ‘*Aquarium*’ (p. 161) gives us some particulars of the habits of this little Crab. He describes it as “inert, folding its legs on itself when touched, and remaining motionless for some time. It buries itself in the gravel, descending backwards; this is a somewhat slow process, suited to its usual phlegmatic habit. It brings its hindmost pairs of feet on each side together, then thrusting

* *Cancer tuberosus*, *Pennant*; *Ebalia Pennantii*, *Leach*.

† *Ann. and Mag. Nat. Hist.* 1852, p. 356.

down their united points opens and expands them, forcing apart the gravel; at the same moment the posterior part of the body is brought down into the hollow thus made, and the action of the feet is repeated. The process is continued until the hinder parts are covered, and the muzzle alone is visible, with the two claws. Thus it sits quite still, reminding one of a toad, the broad triangular pedipalps, that fit so close, occasionally opening, like the folding doors of a tiny cabinet, and allowing the palpi to be thrust out to wipe the minute eyes. The face, when examined with a lens through the glass walls of the Aquarium, has a most funny expression, being singularly like that of an ancient man." Mr. Gosse found that the *Ebalia* was chiefly active at night: its activity however is not great.

EBALIA TUMEFACATA,* Mont. sp. *Bryer's Nut Crab*.—Carapace sub-rhomboidal, smooth, with a smooth reflected margin, and three round elevations placed triangularly. Colour pale dull yellow; arm scarcely twice as long as it is broad.

Found at Weymouth, and at other places on the coast of England and Ireland. The Rev. Alfred Norman took one specimen at Budleigh Salterton in 1852.

* *Cancer tumefactus*, *Montagu*; *Ebalia Bryerii*, *Leach*.

EBALIA CRANCHII, Leach, sp. *Cranch's Nut Crab*.—Front rather deeply notched ; latero-anterior margin of the carapace entire. Arm three times as long as it is broad.

First found by Cranch in Plymouth Sound, and subsequently found elsewhere on the coasts of the British Islands. The Rev. G. Gordon reports it to be very frequent on the fishing grounds of the Moray Firth. "This Crab frequently affords the best preserved specimens of Crustacea that are to be found in that curious agglomeration of the vestiges of organic life—the contents of the fish stomach. From their small size, they often escape the bruising power of the teeth, and the hardness of the carapace resists for a time the attrition and the dissolving power to which they are afterwards subjected."*

FAM. *CORYSTIDÆ*, Leach.

Outer antennæ very large ; hind legs of same size and kind as the others, and employed for the same purposes ; sternal plate narrow and elongated.

Eleven or twelve genera of this family are known to naturalists ; three only of these are British ; one, *Thia*, an interesting addition to our Fauna, discovered on the Irish

* Rev. G. Gordon, in 'Zoologist,' p. 3683.

coast. Most of the species burrow among the sand, for which they are well adapted by their peculiar structure.

Gen. 20. ATELECYCLUS,* *Leach*.

Carapace wide, nearly circular, arcuated in front, and contracted behind; the edges with many teeth. The pits in which the antennæ are placed, longitudinal; the front toothed. Fore legs strong, short. Abdomen of male of five distinct joints, that of the female of seven, the last nearly as large as the preceding, and reaching nearly to the mouth.

ATELECYCLUS SEPTEMDENTATUS, Mont. sp.†—Carapace almost smooth on the stomachal region, armed on its latero-anterior margins with teeth, alternately large and moderate. Hairs on the legs very long and silky.

In deep water on various parts of the coast from Shetland to Cornwall; it was first found by Montagu on the coast of Devonshire. On the Cornish coast it is very common. Mr. Couch remarks that this species must abound at the depth of twenty to fifty fathoms, as he has found thirty in the stomach of a single Cod, and almost every Ray, opened for several days in succession, was found to contain

* Ατελης, imperfect; κυκλος, a circle.

† Cancer (Hippa) septemdentatus, *Mont.*; Atelecyclus heterodon, *Leach*.

them ('Cornish Fauna,' p. 74). In Devon it is named the Old Man's Face Crab.

Gen. 21. THIA, *Leach*.

Carapace heart-shaped, much contracted behind, smooth and arched only from side to side; front wide, lamellar, and considerably projecting; front legs short and compressed; the other legs still shorter, and terminating in a straight and very sharp joint. Abdomen nearly of similar form in both sexes.

THIA POLITA, Leach. *Polished Crab*. (Plate IV. fig. 4.)—Carapace very smooth, and margined with long hairs. Eyes very small. When alive the carapace is of a rosy hue.

Dr. Scouler obtained a specimen at Roundstone, Connemara, which he sent to the British Museum. Dr. Melville sent three specimens to Mr. Bell from Galway; they were found buried in the sand. Their smooth, slightly arched carapace and whole form are well adapted for this habit. It seems to be a common species in the Mediterranean.

Gen. 22. CORYSTES, *Latr.*

Carapace much longer than wide, with a few teeth ; front lamellar, forming a triangular beak. Outer antennæ very large, much longer than carapace, and furnished on upper and lower margins with a row of long hairs. Fore legs of male very long.

Mr. Couch thus refers to the use of the long antennæ. He says that our species burrows in the sand, leaving only the ends of its antennæ projecting above the surface ; he supposes that these organs are of some use beyond their common office of feelers, perhaps assisting in the process of excavation. He remarks, "When soiled by labour, I have seen the Crab effect their cleaning, by alternately bending the joints of their stalks, which stand conveniently angular for this purpose. Each of the long antennæ is thus drawn along the brush that fringes the internal face of the other, until both are cleared of every particle that adhered to them."*

CORYSTES CASSIVELAUNUS, Penn. sp. *Pennant's Long-armed Crab*. (Plate IV. fig. 5.)—Carapace swollen, with two irregular waving grooves, which to the fanciful eye seem to

* Cornish Fauna, p. 74.

mark out the appearance of a face; three spiniform teeth on the side of the carapace, separate from each other.

Found at various parts of the British and Irish coast.

Suborder II. ANOMOURA, *M. Edw.*

In the various species of this suborder, which connects the short and long-tailed suborders, the cephalo-thoracic portion of the body is always much more developed than the abdominal part. This, in some of them, is doubled in under the carapace, in others it is extended. The fifth pair of legs, and sometimes indeed the two hind pairs, are not formed for walking, but are rudimentary, and transformed into organs for holding with, or at least are situated above the level of the other legs. The inner and outer antennæ are generally well developed. In one of the groups, containing *Dromia* and *Lithodes*, the abdomen has no terminal appendages, while in the other, containing the Hermit Crabs, that part is furnished with a pair of movable appendages. The sternal plate is generally linear between the three last legs, and widened in front.

FAM. DROMIADÆ, *M. Edw.*

The body is more or less globular, and the front of the

carapace bent down. The eyes are short, and lodged in well-formed orbits: the inner antennæ are very short, and lodged in a groove.

Gen. 23. DROMIA, *Fabr.*

Carapace thickly covered with short hairs; two hind pairs of legs small, raised above the others on the back, and ending in a double claw, by means of which they can attach themselves to marine substances, such as sponges.

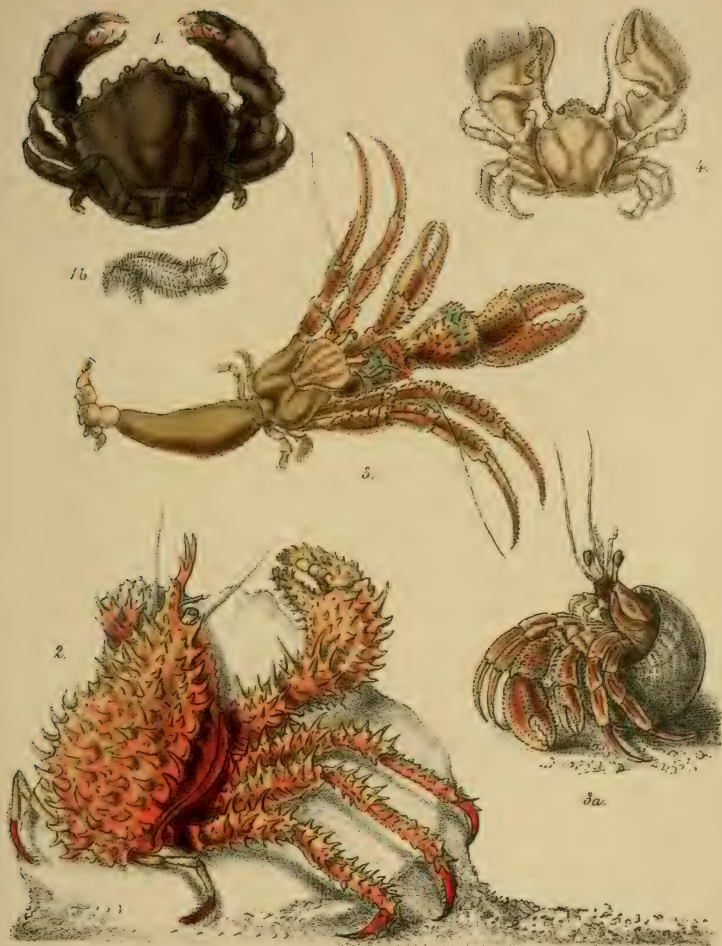
Haan tells us that the *Dromia Rumphii* and other species are not eaten by the Japanese, who regard them as poisonous.*

DROMIA VULGARIS, M. Edw. (Plate V. fig. 1.)—Carapace strongly knobbed above; the sides between the eyes and the middle with four broad teeth, of a deep brown colour, with pinkish claws.

When young, the abdomen very much resembles that of the *Macroura*, being thick, and ending in a fan-like expanded fin, and furnished beneath with false swimming-legs. In this state the *Dromia* seems adapted for swimming; but in the adult state, when the abdomen is smaller and bent under the body, the creature seems to be very sedentary.

First recorded as British by Dr. Gray, who obtained a spe-

* Fauu. Jap. 107.



Sowerby del. et lith.

Vincent Brooks Imp.

- 1 *Dromia vulgaris*. 2. *Lithoë Maia*. 3 *Pagurus Bernhardus*
 4. *Porcellana platycheles*.

cimen in Billingsgate Market, amongst oysters from Whitstable in Essex, in 1825. Mr. Ingall found it at Beachy Head, in Sussex, in 1848. Dr. Lukis told me, in 1856, that this species is taken in fine condition among the Channel Islands.

FAM. *LITHODIADÆ*, *Leach*.

Carapace generally very much covered with spines, and ending in a longish beak. Inner antennæ long and exposed; the second, third, and fourth pairs of legs very long; the fifth pair very short, and not used in walking.

Gen. 24. *LITHODES*, *Latr*.

Carapace triangular, covered with spines. Beak very long; fifth joint of outer jaw-feet oblong, and seldom wider than the fourth. Carapace with its last ring not united in the same piece with the preceding, but free, and even movable. Hind legs very small, and folded back into the interior of the branchial cavities.

There are five or six species of this distinct genus now known to naturalists. Mr. Dana* describes one of these,

* Crustacea of the United States Exploring Expedition, i. p. 428.

the *Lithodes antarcticus*, as being abundant in Fuegia, where it is found in water between two and three fathoms in depth. It creeps along the bottom with sluggish motion, as it has neither legs nor appendages fitted for swimming.

LITHODES MAIA, Linn. sp. *Northern Stone Crab*. (Plate V. fig. 2.)—Beak very long, at the end with two short diverging teeth; legs and carapace covered with spines.

Mr. Harris ('Zoologist,' 3002) describes a specimen newly taken out of the water as being of a burnished dullish scarlet.

Coast of Scotland; and also dredged between the Isle of Man and the Mull of Galloway. Spiny as this species is, even in its young state, it becomes the prey of some of our fishes, as it is occasionally found in their stomach.

FAM. PAGURIDÆ, Leach.

The greater part of the species of this family are remarkable for the more or less complete state of softness of their abdomen, the appendages of which are not symmetrical. The two hind pairs of legs are short. The abdomen is long and rather slender, almost entirely membranous, and rolled on itself. The animal, in order to protect this soft part,

lodges it inside an empty shell, which it carries about with it, and to which it fixes itself by means of its hind legs.

Gen. 25. PAGURUS, *Fabr.* SOLDIER CRAB.

The abdomen is turned on itself, and has a pair of appendages at the end, which are not symmetrical. The inner antennæ are short, and are only slightly longer than the peduncle of the outer antennæ. The species of this country "are peculiar in having acuminate fingers, with the tips of those of the larger hand calcareous; and although the fourth pair of feet are subcheliform, the scabrous area or rasp of the hand is confined nearly to the posterior edge" (Dana).

"The Soldiers (as indeed becomes their profession) are well known to be pugnacious and impudent, yet watchful and cautious. Indeed, their manners and disposition, no less than their appearance, bear the strongest resemblance to those of Spiders. Two of them can scarcely approach each other without manifestations of hostility; each warily stretches out his long feet and feels the other, just as Spiders do, and strives to find an opportunity of seizing his opponent in some tender part with his own strong claws. Generally they are satisfied with the proofs afforded of mutual

prowess, and each, finding the other armed at all points, retires ; but not unseldom, a regular passage of arms ensues ; the claws are rapidly thrown about, widely gaping and threatening, and the combatants roll over and over in the tussle. Sometimes, however, the aggressive spirit is more decided and more ferocious. One in the Aquarium of the Zoological Gardens was seen to approach another, who tenanted a shell somewhat larger than his own, and, suddenly seizing his victim's front with his powerful claw, drag him like lightning from his house, into which the aggressor as swiftly inserted his own body, leaving the miserable sufferer struggling in the agonies of death."*

When the *P. Bernhardus* is the tenant of the whelk-shell, it is a common thing to find the spire occupied as the seat of the *Actinia parasitica*, a fine animal-flower. Mr. Gosse has observed that this association is not the only one that exists. "While I was feeding one of my soldiers, by giving him a fragment of cooked meat, which he, having seized with one claw, had transferred to the foot-jaws, and was munching, I saw protrude, from between the body of the Crab and the whelk-shell, the head of a beautiful worm, *Nereis bilineata*, which rapidly glided out round the Crab's

* Gosse, Aquarium, p. 163.

right cheek, and, passing between the upper and lower foot-jaws, seized the morsel of food, and, retreating, forcibly dragged it from the Crab's very mouth. I beheld this with amazement, admiring that, though the Crab sought to recover his hold, he manifested not the least sign of anger at the actions of the worm. I had afterwards many opportunities of seeing this scene enacted over again; indeed on every occasion that I fed the Crab and watched its eating, the worm appeared after a few moments, aware probably by the vibrations of its huge fellow-tenant's body that feeding was going on, and not by any sense of smell. The mode and the place of the worm's appearance were the same in every case, and it invariably glided to the Crab's mouth between the two left foot-jaws. I was surprised to observe what a cavern opened beneath the pointed head of the *Nereis* when it seized the morsel, and with what force comparatively large pieces were torn off and swallowed, and how firmly the throat-jaws held the piece when it would not yield. Occasionally it was dragged quite away from the Crab's jaws and quickly carried into the recesses of the shell. Sometimes in this case he put in one of his claws and recovered his morsel; at others he gave a sudden start at missing his grasp, which frightened the worm, and made it let

go and retreat; but sometimes the latter made good his foray, and enjoyed his plunder in secret." Mr. Gosse informs us that at Weymouth this worm is specially prized by the fishermen as bait; and so well aware are they of its habits, that they commonly break all whelks containing the Crabs, in order to extract the *Nereis* which they know to be within.

Mr. Gosse has observed the Soldier Crab changing his residence for a more roomy one. For an amusing description of the "flitting" we refer our readers to the pages of the 'Aquarium' (pp. 167-171).

PAGURUS BERNHARDUS, Linn. sp. *Soldier or Hermit Crab*. (Plate V. fig. 3.)—Second and third pairs of legs spiny and tubercular on their upper edge; their last joint slightly twisted, somewhat widened towards the end. Hands strongly tuberculated.

Common everywhere on our coast, inhabiting different shells according to its age and size. Sometimes, as at Pegwell Bay, the creature selects one of the land-shells which suits its purpose, such as that of the large common Snail (*Helix aspersa*). The Hermit Crabs are used for bait; the young, Mr. Gordon observes, are often called by the ignorant "the spawn of the Lobster."

PAGURUS PRIDEAUXII, Leach. *Prideaux's Hermit Crab.*

—Second and third pairs of legs with the edges nearly smooth; their tarsal joint straightish, grooved on the sides, and very gradually diminishing in thickness towards the end. Hands simply granulated.

First sent from Plymouth Sound by Mr. Prideaux to Dr. Leach, who named it after him. It has been found in other parts of the English, Irish, and Scottish coasts. The shell, inhabited by this Hermit Crab, is frequently parasitically invested by the curious *Adamsia maculata*. The Rev. Alfred Norman finds it to be very abundant in the Clyde; he says, "I have never found the *Adamsia* associating with *P. Bernhardus*."

PAGURUS CUANENSIS, Thompson.—Fore feet unequal, hispid, spinous; the palpus of the outer antennæ as long as the eye-stalk; their basal tooth denticulate on the inner side, half as long as the palpus.

A species found by Mr. Thompson at Portaferry and in Bangor Bay, and by Dr. Drummond in Belfast Bay. The Rev. G. Gordon finds it in the Moray Firth, and Mr. Eyton off the Isle of Man. The Rev. Alfred Norman finds it frequent at Weymouth, and at Cumbræ, and Lamlash Bay in the Firth of Clyde.

PAGURUS ULIDIANUS, Thompson.—Carapace with a minute beak ; inner antennæ the length of the basal portion of the outer ; fore feet nearly equal ; hand elongated, the sides parallel, roughly granulated ; inner margin of the wrist toothed.

A small species found by Mr. Thompson at Portaferry. Dr. Howden met with it in the Firth of Forth, and the Rev. Alfred Norman off Cumbrae.

PAGURUS FASCIATUS, Bell.—A smooth species, with the anterior legs unequal ; the hand oval, smooth ; eye-stalks as long as the penultimate joint of the outer antennæ, and nearly half as long as the whole of the inner antennæ ; body and legs banded alternately with red and blue.

Described by Professor Bell from a drawing of a specimen found at Falmouth by Mr. Cocks.

PAGURUS HYNDMANNI, Thompson.—Fore legs unequal ; hand oval, minutely granulated, outer margin denticulated ; eye-stalks much shorter than basal part of outer antennæ ; inner antennæ four times as long as the eye-stalks ; second joint of lower antennæ long.

Found by Mr. Thompson at Portaferry, and in Belfast Bay by Dr. Drummond. It is a common species in the Firth of Forth, according to Dr. James Howden. The Rev.

Alfred Norman finds it at Weymouth and Falmouth, but remarks, "My finest specimens are from the Clyde, where it occurs in ten to fifteen fathoms, in muddy bottom."

PAGURUS LÆVIS.—Eye-stalks short and thick, reaching to the middle of the third joint of inner antennæ; hand minutely granulated, polished, with two obsolete teeth at the base towards the inner side, and a minute tubercle at the outer.

Found by Mr. Thompson at Portaferry, and by Mr. Cocks at Falmouth. Dr. Howden finds it in the Firth of Forth, and Mr. Gordon observes that it is abundant in the Moray Firth, and that, judging from the habit of the fishes that prey on it, it does not come near the shore. Mr. Eyton takes it off the Isle of Man.

PAGURUS FORBESII, Bell.—Eye-stalks club-shaped, as long as the basal portion of the inner antennæ; hand with irregular depressions, rough, and strongly denticulated on the inner side; the whole of the legs with numerous small reddish-brown spots.

Found by its first describer, Professor Bell, among some *Paguri* sent to him from Falmouth by Mr. Cocks. It is found in the Firth of Forth but rarely, according to Dr. James Howden.

PAGURUS THOMPSONI, Bell.—The whole of the legs hispid and spinous, anterior pair unequal; the wrist as long as the hand; eye-stalks extending to half the length of the last joint of the peduncle of the outer antennæ; spine of antennæ curved outwards, and furnished with a row of small spines on the outer edge.

First described by Professor Bell from a specimen dredged in fifty fathoms, by Mr. Hyndman, in the entrance of Belfast Bay.

PAGURUS DILLWYNII, Bate.—First pair of feet unequal, left much longer than the right, second and third joints armed with teeth; outer antennæ shorter than in any other British species, not so long as longest fore-leg.

First described by Mr. Spence Bate from a specimen taken near the Worm's Head, Swansea, where it is said to burrow rapidly in the sand. It is also found in Cornwall.

Fabricius has described in his Supplement (p. 414) a *Pagurus* from the coasts of Scotland, under the name of *P. Araneiformis*. It may be one or other of the preceding.

FAM. PORCELLANIDÆ, M. Edw.

Tail ending in swimming-plates, much as in the *Ma-*

croua. Fifth pair of legs filiform, small, folded up above the others. Sternal plate very wide, and nearly circular.

Gen. 26. PORCELLANA, *Leach*.

Carapace as wide as long, suborbicular, and depressed above. Eyes small. Outer antennæ very long. Outer jaw-feet very large. Front legs very large, and more or less flattened. Abdomen wide, folded under the carapace on the sternum, of seven distinct rings, and with a terminal swimming-fin of five plates.

PORCELLANA PLATYCHELES, Penn. sp. *Broad-clawed Crab*. (Plate V. fig. 4.)—Hands wide and flattened, their claws triangular. Forehead projecting, and divided into three flattened teeth, the middle one not grooved; second, third, and fourth pairs of legs hairy.

Common on the coast, under stones.

Mr. Kingsley* gives the following picture of this Crab :—“Turn a few stones which lie piled on each other at extreme low-water mark, and five minutes’ search will give you the very animal you want,—a little Crab, of a dingy russet above, and on the under side like smooth porcelain. His back is quite flat, and so are his large angular fringed

* Glaucus, or the Wonders of the Shore, p. 152.

claws, which when he folds them up lie in the same plane with his shell, and fit neatly into its edges. Compact little rogue that he is, made especially for sidling in and out of cracks and crannies, he carries with him such an apparatus of combs and brushes as Isidor or Floris never dreamed of; with which he sweeps out of the sea-water at every moment shoals of minute animalcules, and sucks them into his tiny mouth."

Mr. Gosse, in his 'Aquarium' (p. 47), has given some interesting observations on the habits and structure of this little Crab, whose usual abode is in the crannies and clefts of rocky ledges, and beneath stones which lie at the verge of low-water. He says, "As soon as it is dropped into the Aquarium, it throws out its abdomen or tail, and gives several smart flaps with it, which shoot it along diagonally backwards, as if to say, 'Though you see I am a Crab, I have learned to behave myself in some things like my courtly cousins, the Lobster family.' But he is not much of a swimmer; the flaps merely bring him to the bottom slantwise, instead of perpendicularly, whence he does not rise again. You turn your head away, and on looking again you cannot think what is become of your Broad-claw! I have put in half-a-dozen at a time, and have been asto-

nished that in a few moments not one was to be seen ; till, perhaps weeks afterwards, on cleaning out the tank, I have found every one clinging fast to the under side of some piece of stone that lay on the bottom. When I knew this, I placed flattish stones so close to the glass sides that I could look beneath them, and had the pleasure of finding them occupied by the Broad-claws. The crevice formed by the inclination of the stone to the bottom may be very narrow, and I am not sure but that the Crab likes it all the better, for he is expressly formed for such a dwelling ; his body is particularly flat, his legs move in the same plane, and his claws, though large for his size, are remarkably flat also, thinned out, as it were, to an edge ; so that the whole animal has somewhat the appearance of having been crushed flat by the pressure of the stone under which he lives. Here then is a beautiful adaptation of structure to habit ; but there is more of the same kind. The Crabs are carnivorous, and in general they are very active, wandering continually in search of prey, which they seize, when observed, with their claws. How is our little Broad-claw to live, clinging fast to his cranny, which he forsakes not from one month's end to another. Like the thrifty housewives of London, who do not go to market, but have their bread, and meat,

and groceries brought to their door.” Mr. Gosse describes how this is managed. All the joints of the external pedipalps are fringed with hair which curves inwards. Mr. Gosse thus proceeds:—“Watching a Broad-claw beneath a stone close to the side of my tank, I noticed that his long antennæ were continually flirted about; these are doubtless sensitive organs of touch, or some analogous sense, which inform the animal of the presence, and perhaps of the nature, of objects within reach. At the same time I remarked that the outer pedipalps were employed alternately in making casts, being thrown out deliberately, but without intermission, and drawn in, exactly in the manner of the fringed hand of a Barnacle, of which both the organ and the action strongly reminded me. I looked at this more closely with the aid of a lens; each foot-jaw formed a perfect *spoon* of hairs, which at every cast expanded and partly closed. That you may understand this better, I must say that the foot-jaw resembles a sickle in form, being composed of five joints, of which the last four are curved like the blade of that implement. Each of these joints is set along its inner edge with a row of parallel bristles, of which those of the last joint arch out in a semicircle, continuing the curve of the limb; the rest of the bristles are curved parallel or concen-

trical with these, but diminish in length as they recede downwards. It will be seen therefore that when the joints of the foot-jaw are thrown out, approaching to a straight line, the curved hairs are made to diverge; but as the cast is made, they resume their parallelism, and sweep in, as with a net, the atoms of the embraced water." Mr. Gosse, in examining these hairs with the microscope, finds that each individual bristle is set on each side with a row of short stiff hairs, projecting nearly at right angles to its length. These hairs meet those of the adjoining bristle point to point, and so on in succession; and so there is formed a most perfect net of regular meshes, which must enclose and capture every animalcule that floats within its range, while at each outcast it opens at every mesh, and allows all refuse to be washed away or fall to the ground.

PORCELLANA LONGICORNIS, Linn. sp. — Hands long, straight, and thick, their claws slender. Forehead divided into three lobes, the middle one deeply grooved; second, third, and fourth pairs of legs with few hairs.

Common under stones and in crevices of the *Eschara foliacea*. The Rev. G. Gordon, writing on the Crustacea of the Moray Firth, observes that the voracious Cod does not overlook these puny Crabs, but, in feeding on them, makes

numbers compensate for its small size. The Rev. Alfred Norman remarked, that the southern specimens are smaller and paler in colour than those he took in the Clyde, under stones at extreme low water. Mr. Couch* has described a minute *Porcellana* found by him in Cornwall on a coralline from deep water; he has named it *P. acanthocheles*. He says that "on the ridge of the second section of the hand-legs there are two well-marked spines. The carapace in front is divided into three scarcely separated portions." This seems to be only a young specimen of *P. longicornis*.

Suborder III. MACROURA, Latr.

This suborder, of which the Lobster is a well-marked example, is distinguished by the great development of the abdomen, which is generally extended and longer than the carapace; the seven rings of which it is composed are all movable, and the first five have generally each a pair of false feet, with two terminal plates finely ciliated on the edges, and which act as oars when they swim. The abdomen is furnished at the end with a large swimming tail formed of five plates arranged like a fan.

* Cornish Fauna, p. 76.

All the Crustacea of this suborder are essentially swimmers. They walk but little, and do not leave the water. The abdomen and the great fan-like tail are the principal organs of locomotion.

FAM. GALATHEIDÆ, M. Edw.

Outer antennæ without movable plate. Body depressed; the fifth pair of legs very slender, not fitted for locomotion, and folded back above the base of the preceding pair. The carapace is depressed and rather wide, but is longer than broad; it ends in a beak which projects more or less, and covers the base of the eye-peduncles. The front legs are large, and terminate in a well-formed pair of fingers. The abdomen is as wide as the carapace, and longer than that part. This family seems to connect the *Macroura* and *Anomoura*; and indeed, by many naturalists it is regarded as a portion of the *Porcellanidæ*. Very little is known of the habits of the species of this family. A curious species, the *Grimothea gregaria*, was found, on Captain Cook's voyage, in great shoals off the coast of Patagonia, where, from the softness and delicacy of its covering, it must form most acceptable food to many a fish and sea-bird. Mr. Couch, in a communication to Professor Bell on the habits of one

of the British species, *Galathea strigosa*,* remarks, that although it is, generally speaking, very slow in its motions, yet in swimming it darts from spot to spot with the rapidity of an arrow. It seeks the shelter of stones, or some hole in the rock to which it can withdraw on the slightest alarm. Mr. Couch adds, "It is very remarkable to witness the accuracy with which they will dart backward, for several feet, into a hole very little larger than themselves. This I have often seen them do, and always with precision."

Gen. 27. GALATHEA, *Fabr.*

Carapace with the surface covered with grooves, furnished with small hairs. Beak prominent and spined on the sides. Eyes large, without any trace of an orbit. Front legs large, long, and depressed. Abdomen extended. (Plate VI. fig. 1 *a* shows its outer jaw-feet. Mr. Gosse, in his 'Tenby,' p. 169, tabs. 7 and 8, figures the young of *Galathea* in two stages; the latter figure bears considerable resemblance to the adult animal, while the former has no resemblance to it, with its long spine projecting from the forehead, and two spines from the hind part of the carapace.)

* History of British Stalk-eyed Crustacea, p. 202.



Scudum 1 et 2.

1. *Galathea sinigosa*.

2. *Palinurus homarus*.

Vincent Brooks Imp.

GALATHEA SQUAMIFERA, Mont. sp. *Montagu's Plated Lobster*.—Beak short, wide, armed with nine spine-like teeth. Front legs wide, flattened, spiny on the sides, and furnished above with scale-like tubercles. Outer jaw-feet with the third joint much longer than the second. Greenish-brown, occasionally tinged with red.

Under stones at low-water mark, south and west coast of England, Irish coast, Firth of Forth. The Rev. Alfred Norman found it at Cumbrae, in the Firth of Clyde.

GALATHEA STRIGOSA, Linn. sp. *Common Plated Lobster*. (Plate VI. fig. 1.)—Beak triangular, and armed with seven strong, spine-like teeth. Front legs broad, very spiny, spined on both edges. Outer jaw-feet with the third joint shorter than the second. Red, with blue lines and spots.

Found in deeper water than the last. Mr. Harris has found it as far north as the Moray Firth, and Dr. Howden takes it in deep water near the Bass, at the mouth of the Firth of Forth.

Mr. Couch remarks of this species, in his 'Cornish Fauna' (p. 76), that it is "incapable of any motion but backward, and rarely rises above the bottom, where, by a laborious motion of its tail, it contrives to retreat from its enemies; but its usual progress is creeping, and by the legs only."

GALATHEA NEXA, Embleton. *Embleton's Plated Lobster*.
—Fore legs with the hands hairy, and without spines; the outer jaw-feet with the third joint shorter than the second.

A small species, first found by Mr. Embleton. The Rev. G. Gordon says it is frequently brought up by the lines set for Haddock and Cod in the Moray Firth ('Zoologist,' 3684). In the Firth of Forth it is frequently dredged in mud, in from three to twelve fathoms (Dr. Howden).

Mr. Norman found it at Falmouth, in fifteen fathoms. Mr. Bell procured specimens from Loch Fyne and Shetland; and by Mr. Thompson's account it is also found on the coasts of Down and Antrim.

Gen. 28. MUNIDA, *Leach*.

Resembles *Galathea* in many of its characters, but differs chiefly in the formation of the beak and legs: the beak is a long, style-like spine, with a similar but shorter spine on each side at the base; the front legs are very long, slender, and cylindrical.

It seems to be to this genus and to the very same species that the *Calypso periculosa* of Risso is to be referred; this Crab is said to be very unwholesome when eaten, and the

spines of its beak are reported to give venomous wounds. (See Desmaret's 'Considerations' p. 193.)

MUNIDA BAMFFICA, Penn. sp.* *Long-clawed Lobster*.—Abdomen with the second and third segments furnished with some small spines on their front margin.

Found in deep water from Shetland to Cornwall. It was first described by Pennant, who received it from the Banffshire coast. Mr. Robert Gray finds it in the Firth of Forth, at Dunbar. It is common on the Irish coast. The Rev. Alfred Norman finds it in the Firth of Clyde, where however it is by no means common.

FAM. SCYLLARIDÆ, Latr.

Carapace wide. Outer antennæ without movable plate. Fifth pair of legs similar to the preceding, and not folded back above them; all the legs one-clawed; outer antennæ very large and foliaceous; abdomen very wide and ending in a swimming tail, fan-like as usual, but having the plates soft and flexible for three-fourths of their length. The first abdominal ring without appendages, but each of the four following segments has a pair of false feet; in the male, the

* *Galathea rugosa*, Fabr.; *G. longipeda*, Lam.; *Munida Rondeletii*, Ber.

first pair of false feet is very large, and have two wide foliaceous plates, the following have only one plate, of which the size rapidly diminishes; in the female, all these appendages are much more developed, and form a support for the eggs.

Gen. 29. SCYLLARUS, *Fabr.*

Carapace longer than wide; the orbits situated not very far from the front angles of this shield; the sides of carapace are parallel.

These Crustacea are said to prefer shallow water with a soft bottom, in which they dig holes deep enough to contain them, and where they spend the greater part of their time, only leaving this retreat when searching for their food. Dehaan tells us that the *Scyllarus ciliatus*, a purplish-red species with very small blue points, is a favourite food of the Japanese ('Fauna Japonica,' p. 153).

SCYLLARUS ARCTUS, Linn. sp. *The Broad Lobster.* (Plate VII. fig. 1.)—Beak-like prolongation of carapace very wide but not projecting, and ending in front in a straight margin: carapace with scale-like tubercles, and armed on the median line with a series of spines; outer antennæ large and strongly toothed; abdomen sculptured above. Colour,



Sowerby del. et lith.

Vincent Brooks Imp.

1 *Syllarus Arcus* 2 *Callinassa subterranea* 3 *Gebia stellata*.

4 *Potamobius Astacus*.



brown with transverse red lines on the abdomen. Length, three inches.

Pennant records this as having been found by Dr. Borlase, on Careg Killas, in Mount's Bay, Cornwall, and a specimen, procured in Cornwall in 1856, was sent to Sir Wm. Jardine, Bart. It occurs among the Channel Islands, as I am informed by Dr. Lukis of Guernsey. This species abounds in Greenland, where, according to Otho Fabricius,* it forms the principal food of the *Alea arctica*.

FAM. *PALINURIDÆ*, Leach.

Body nearly cylindrical. Outer antennæ very thick and long; basilar joint very large. Legs all ending in one toe: sternal plate very wide. (Plate VI. fig. 2 *a* represents one of the outer foot-jaws.)

There are many species of this family in different parts of the world. They are generally esteemed as food. Siebold says that the *P. Japonicus* is much prized in Japan, and that the Japanese take out the meat and viscera, and having dried the shell, exhibit it in some of their festivities at the New Year, as the symbol of old-age.†

* Fauna Grœnlandica, p. 243. † Dehaan, Fauna Japonica, p. 159.

Gen. 30. PALINURUS, *Fabr.*

Carapace spiny, its front margin with two thick, horn-like spines projecting over the eyes and the base of the antennæ. Outer antennæ very long and thick, the basal joints very large and spiny. Legs all ending in one toe. Middle of the front of the carapace with a small more or less projecting, beak-like tooth.

PALINURUS VULGARIS.* *Spiny Lobster*. (Plate VI. fig. 2.)
—The lateral horns of the front smooth above and armed below with many sharp little teeth.

Of a purplish-brown, with dull white spots.

Common on the southern coasts of England and Ireland, whence it is sent to the London market, where it is much esteemed as food. Mr. Couch ('Cornish Fauna,' p. 77) says that its long and unyielding antennæ frequently hinder it from entering the Crab-pots. He adds that, "keeping in companies, it also gets entangled in the trammel net, and in some abundance on the fishermen's lines." It is often called the Craw-fish, and sometimes the Red Crab.

* Cancer Homarus, *L.*; Palinurus quadricornis, *Fabr.*; Palinurus vulgaris, *Latr.*

FAM. *THALASSINIDÆ*, Bell.

Abdomen very long, its teguments not very firm: carapace small and much compressed on the sides; sternal plate almost linear throughout its whole extent. Front legs large; outer antennæ without a movable plate, excepting in the genus *Calocaris*.

It would seem that some of the exotic species of this family must have the power of occasionally leaving the water and remaining out of it for a considerable time, as one species is reported to do considerable injury to newly made roads, by burrowing in them and making holes.

Gen. 31. CALLIANASSA, Leach.

Carapace very small, without a beak. Eye-stalks almost lamellar. Third pair of legs very wide near the end, their penultimate joint almost oval; it is with this pair of feet chiefly that the *Callianassa* digs its burrow in the sand. Second pair of legs two-toed. Front legs very large, one of the hands much more developed on one side than the other, compressed.

Abdomen very large and somewhat depressed; widest beyond the middle.

Mr. Say* describes a species of this genus as indigenous to the United States; the exuviae of this, particularly of its large front foot, occur very frequently on the sea-beach of the southern States, early in the spring. The Crab itself is seldom seen, owing to its recluse mode of life. He found the living specimen by digging in the sand of the bay shore of the river St. John, in East Florida, about eighteen inches below the surface. "It had formed a tubular domicile, which penetrated the sand in a perpendicular direction to a considerable depth, the sides were of a more compact consistence than the surrounding sand, projecting above the surface about half an inch or more, resembling a small chimney, and rather suddenly contracted at top into a small orifice. The deserted tubes of the *Callianassa* are in many places very numerous, particularly where the sand is indurated by iron into the incipient state of sandstone; they are always filled up, but may be readily distinguished by the indurated walls and summit often projecting a little above the general surface."

CALLIANASSA SUBTERRANEA, Mont. sp. *Mud-burrower*. (Plate VII. fig. 2.)—Colour during life more or less orange, sometimes yellow on the sides and on the tail, the arms

* Journal of the Academy of Natural Sciences of Philadelphia, i. p. 240.

usually pink. The crustaceous covering very thin. Movable finger of the large claw blunt and scarcely toothed beneath; wrists and hands smooth; middle plate of caudal fin very broad, but much shorter than the side pieces. Length two inches (exclusive of arms).

First found by Colonel Montagu, at the depth of nearly two feet beneath the surface, on a sandbank in the estuary of Kingsbridge. It seems to be not uncommon in the Moray Firth, as parts of it are often found in the stomach of the Haddock. (Rev. G. Gordon in 'Zoologist,' 3684.)

Gen. 32. AXIUS, *Leach*.

Outer antennæ nearly as long as the body, the peduncle furnished above with a small movable spine; inner antennæ with two setæ nearly as long as the carapace; outer foot-jaws rather slender, pediform joints nearly of equal length. Front feet unequal, compressed, two-toed, the other pairs slender, compressed, simple: carapace much compressed; abdomen rounded above, the five intermediate joints of nearly equal length; the caudal joint elongate-triangular.

AXIUS STIRHYNCHUS, *Leach*. *Slow Shrimp*.—Beak short,

stout, elongate-triangular, with a raised granular margin and a raised central longitudinal line; first ring of abdomen short; central caudal plate elongate-triangular; a row of spines on outer surface of hand.

Sidmouth, Plymouth, and Cornwall. Mr. Couch, in his 'Cornish Fauna' (p. 77), says that, "this species, like those of the genus *Callianassa*, has the habit of burrowing in the sand, from which it rarely emerges, and then it seeks shelter in a crevice covered with weeds, for it is sluggish in its motions, and if distant from a soft bottom in which to sink, incapable of escaping an enemy. A female that I obtained loaded with spawn, was dug out of the sand in the middle of summer."

Mr. Couch describes* what he regards as a species distinct from *A. stirhynchus*, but without assigning it a name; he thus distinguishes it:—"Beak stout, short, elongate-triangular with a raised, festooned margin, and a raised, central longitudinal line; first ring of abdomen small, and on its fore margin are two projections which pass forward and join the hind portion of carapace; central caudal plate quadrangular."

* Zoologist, Oct. 1856, p. 5282.

Gen. 33. GEBIA, *Leach*.

Carapace with a triangular beak. Outer antennæ without a scale at their base. Outer jaw-feet pediform. Second pair of legs with one toe; all the legs indeed, except the first, have but one toe. Abdomen long and much narrower at the base than towards the middle; it is depressed and ends in a large fin, of which the four side-plates are foliaceous and very wide. First ring of abdomen with a pair of very small filiform appendages; the four succeeding segments with three pairs of false swimming-legs.

GEBIA STELLATA, Mont. sp. *Mud-borer*. (Plate VII. fig. 3.)—Colour yellowish-white, covered with minute stellated orange spots. Front of carapace roughened with minute spines arranged in longitudinal rows. Length nearly two inches.

First found by Colonel Montagu at Kingsbridge, where it seemed to inhabit the subterraneous passages made by *Solen vagina*; but there is no doubt that, like some others of its family, it is a great borer itself.

GEBIA DELTURA, Leach.—A much larger species than the preceding; with the back of the abdomen membranaceous, outer lamella of the tail slightly rounded and dilated

at the tip, the inner plate truncated, hands furnished with lines of hairs.

Hab. Plymouth Sound and Moray Firth. In the latter locality, according to the Rev. Mr. Gordon, it is more common than the *Gebia stellata*, of which however it may prove to be only the female, as it is found associated with it in the same burrows. Mr. Couch finds the remains of this abundantly in the stomachs of rays and thornbacks, caught in from thirty to fifty fathoms of water.

Gen. 34. CALOCARIS, *Bell*.

Eyes rudimentary, subglobose, without any pigment or cornea. Outer antennæ with a large triangular scale at the base. First pair of legs very long, compressed; fingers very long, slender, much flattened; second pair with two toes; the others one-toed, long and slender. Carapace very large, with a sharp beak. Abdomen long, compressed, enlarged about the middle, contracted at each end. Central plate of tail longer than broad, rounded.

This remarkable form, first described by Professor Bell, is founded on a species first dredged by Mr. M'Andrew, in compliment to whom it is named.

CALOCARIS MACANDREI, Bell. (Plate VIII. fig. 4.)—Of a very thin structure, its texture being slight and flexible. When alive it is of a delicate pink or pale rose; the whole of the feet and other appendages are hairy.

Found by Mr. M'Andrew in Loch Fyne and the Mull of Galloway; and subsequently, when dredging in the Firth of Forth, in 1851, he got a quantity of haddocks, the stomach and intestines of one of which were filled with it. He found it also in the Isle of Skye and off Mull. The Rev. G. Gordon ('Zoologist,' 3684) found it in the stomachs of haddocks taken in the Moray Firth. Mr. Thompson had got the hands in the stomach of a flat-fish off the Irish coast. Professor Bell remarks that Mr. M'Andrew and the late Professor Forbes "have completely established the remarkable fact, that it occasionally inhabits a depth of no less than one hundred and eighty fathoms, in which situation it is fossorial in sandy mud. Now it is clear that at such a depth, and of fossorial habits too, distinct vision would be useless and unavailing; and this at once accounts for the rudimentary character of the eyes, which are entirely white."

FAM. *ASTACIDÆ*, *Leach*.

Outer antennæ with a movable plate at the base. Body elongated and slightly compressed; carapace well developed, with a moderate-sized beak covering the base of the eye-stalks. First pair of legs very large and two-clawed; second and third pairs slender and two-clawed; fourth and fifth pairs one-clawed. Abdomen nearly of the same breadth throughout; side of each segment extended like a plate, so as to cover more or less completely the base of the false legs. Tail very large, and broad outer plate on each side with a transverse joint.

Gen. 35. POTAMOBIOUS, *Leach*.

Beak depressed and very wide at the base, and armed on each side with a tooth. Last thoracic ring movable.

A genus confined to fresh-water. It is found in rivers and brooks. The species are very voracious.

POTAMOBIOUS FLUVIATILIS.* *The River Cray-fish*. (Plate VII, fig. 4.)—Beak of the length of the peduncle of outer antennæ, each side armed with a tooth situated about one-third from the end, and furnished with a slight elevation

* *Cancer Astacus*, *L.*; *Astacus fluviatilis*, *Fabr.*; *Potamobius fluviatilis*, *Leach*.

down the middle. Carapace finely granulated, of a greenish-grey.

Hab. Rivers and streams, betaking themselves to holes in the banks.

This species is eaten, but has no great flavour.

Gen. 36. ASTACUS, *Fabr.*

Beak narrow, and armed with several teeth on each side. Eyes spherical. Last joint of carapace cemented to the preceding. Outer antennæ with the basal plate small, and resembling a movable tooth. Hands extremely large, and compressed, the wrist elongated.

ASTACUS GAMMARUS.* *Lobster*.—Beak longer than the peduncle of outer antennæ, armed on each side with three conical thick teeth; there are no teeth on the under surface.†

Found generally on our rocky coasts.

In fishing for lobsters, according to Mr. Couch (*Cornish Fauna*, p. 78), bait is used which is tainted, or has been pre-

* *Cancer Gammarus*, *L.*; *Astacus marinus*, *Fabr.*; *Homarus vulgaris*, *M. Edw.*

† In the American Lobster the under side of the beak has two conical teeth placed near the point.

served by salting. According to that author, Lobsters are much less abundant in Cornwall now than they were formerly. He says one fisherman used to take 640 in a week, where now he perhaps does not take half that number in a season. The reason assigned for this falling off is that the fishing for congers is not followed as formerly, and it is certain that the conger-eel feeds eagerly on them. It is also likely that the great demand has diminished their numbers. Mr. Bell tells us that the principal supply in the London market is from Norway, whence at least 600,000 are annually sent. The older fishermen in the Moray Firth assured Mr. Gordon that the Lobsters on the Elginshire rocky coasts were so diminished in numbers, fifty years ago, by parties who supplied the London market, that they have ever since been comparatively rare.*

In Dickens's 'Household Words'† there is an amusing article devoted to Lobsters, from which we may make a short extract. "They are a kind of marine Muscovites, bristling with rage against every one,—fierce, hard, horny and pugnacious, always tearing and rending something, and losing their limbs with as much indifference as if they belonged to some salt-water Czar. . . . If you wish for

* Zoologist, p. 3684.

† July 29, 1854.

evidence of their pugnacity, look at their claws. One of them is always a great deal smaller than the other. Observe the left claw, with which the Lobster (like a human being sparring) wards off the blows aimed at him. Examine the right, or striking claw. That which now garnishes the dexter limb is not the real original cheliform, but a supplementary pair of pincers, thrown off long ago in some midnight submarine brawl. In case of emergency your thorough-bred Lobster parts with a claw, with as little concern as a man tearing the tail off his coat in a hedge, when a mad bull is after him. The late Sir Isaac Coffin, who used to tell a great number of odd stories, was once witness, he said, to a terrible battle between two armies of Lobsters in the harbour of Halifax, in Nova Scotia. They fought, he declared, with so much fury that the sea-shore was strewn with their claws. Sir Isaac was the admiral on the station, and ever afterwards, when he saw a Lobster, he pointed to the disparity between the claws in corroboration of his story."

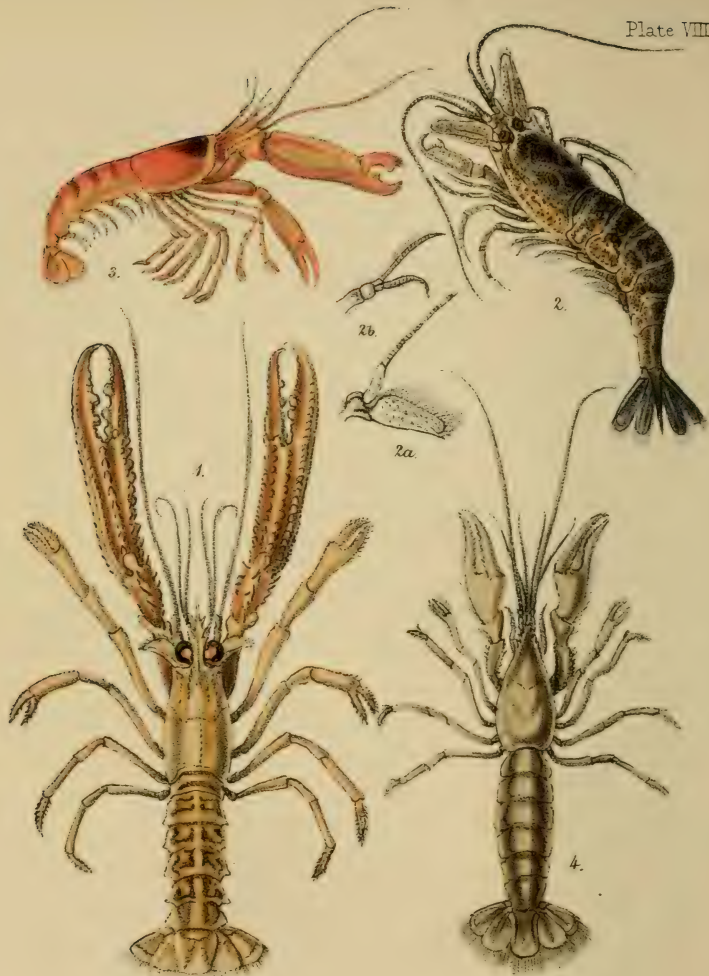
The "tail," or rather abdomen, of the Lobster, the joints of which fold so beautifully on each other, suggested to James Watt the idea of a flexible pipe, which he constructed for some Water Company.

To give some idea of the number of Lobsters brought to London,—that mart for everything edible,—it may be mentioned that between May and June, 1855, upwards of 40,000 Lobsters were sent from the Orkneys alone, one dealer having shipped 24,000. Each Lobster averages 2*s.* 6*d.* in London; so that to the Orkneys alone £5000 were derived in these two months from the Lobsters of her rocky coasts.

Dr. Lukis, of Guernsey, kindly informed me by letter, that, during the summer season, 3050 Lobsters are exported from the Channel Islands to Southampton every week, and are collected by local traders from the Islands as follows: from Guernsey 1500, from Sark 1000, from Jersey 500, and from Alderney 50. They are never sold by weight; the trade price is variable according to the season: in the summer it is about ten shillings per dozen, by numbers, of all sizes; the best, sorted, at from twelve to fourteen shillings per dozen. The numbers consumed in the Islands are very considerable, but difficult to ascertain.

* Witness, July 4, 1855.





Sowerby del. & lith.

Vincent Brooks Imp.

1 *Nephrops Norvegicus*. 2 *Grangon vulgaris*. 3 *Alpheus ruber*.
4 *Calocaris Macandrei*.

Gen. 37. NEPHROPS, *Leach*.

Beak slender, and furnished with several teeth on each side. Eyes large and kidney-shaped. Lamellar appendage of outer antennæ is wide and long. Fore legs long and prismatic; hand of the two following pairs compressed. Last ring of carapace slightly capable of motion.

NEPHROPS NORVEGICUS, Linn. sp. *Norway Lobster*. (Plate VIII. fig. 1.)—Carapace pubescent, armed with points on the stomachal region, and with three granular lines on the posterior half. Hands furnished with four serrated crests. Abdomen with transverse and oblique grooves filled with a close-set pubescence.

Common on the Scottish and some parts of the Irish coasts. Dr. Howden says that in the Firth of Forth it is common in deep water. It is much esteemed as food. The Rev. Alfred Norman takes it in the Firth of Clyde.

Tribe CARIDITA.

The Crustacea of the next four families belong to a division named *Salicoques* by the French. Their body is generally laterally compressed; the abdomen very large,

and its teguments horny. The outer antennæ are furnished at the base with a very large plate, which conceals their origin. The legs are for the most part slender and very long, and the false swimming-feet are enveloped at the base by the lamellar prolongation of the segments of the abdomen. The tail-fin is large and well formed. This group is very extensive in species, and includes the well-known Shrimp and Prawn.

FAM. *CRANGONIDÆ*, *M. Edw.*

Inner antennæ inserted on the same line as the outer. First pair of legs terminate in a subcheliform band. (Plate VIII. fig. 2 *a*, shows inner antennæ; fig. *b*, the outer.)

The Arctic species of this family are much larger than the others. In some of the northern seas, particularly in the Bays of Spitzbergen, these Shrimps appear to abound, and must supply food even to the walrus and seal.

Gen. 38. *CRANGON*, *Fabr.*

Carapace considerably depressed. First pair of legs strong, ending in a flattened hand, on the front edge of which there folds down a movable fang; two next pairs of legs very slender—the second generally ending in two small

claws; the third, fourth, and fifth pairs one-clawed—the fourth and fifth pairs much stronger than the others. Abdomen very large.

CRANGON VULGARIS.* *Common Shrimp*. (Plate VIII. fig. 2.)—Second pair of legs nearly as long as the third. Carapace and abdomen nearly quite smooth; there is a small spine on the stomachal region, and one above each branchial region. Middle plate of fin pointed, and not grooved above.

It is in spawn all the summer months; the ova are of a dirty-white colour. When alive of a greenish-grey, spotted with brown. When boiled this does not become red like most of the group.

Common on the coast on sandy bottoms, in which it buries itself by means of its hinder legs, which are stronger than those preceding them; it heaps the loose sand on itself with the antennæ.† This is the Shrimp caught in such quantities on our coasts, and used as food.

CRANGON FASCIATUS, Risso. *Banded Shrimp*.—A transverse brown band on the fourth ring of the abdomen, which is somewhat gibbous and considerably narrowed behind;

* *Astacus Crangon*, *Herbst*; *Crangon vulgaris*, *Fabr.*

† Couch, 'Cornish Fauna,' p. 79.

the peduncle of the inner antennæ is much shorter; the lateral spines of the carapace are scarcely marked, and there is no sternal spine between the base of the second pair of legs. Nearly an inch long.

Salcombe Bay, Devonshire (Alder). First ascertained to be British, and described in Professor Bell's work (p. 259). Mr. W. Thompson got two at Weymouth, in June 1853; one of these was in spawn: the eggs were of a rich brown. The Rev. Alfred Norman obtained it at Falmouth.

CRANGON SPINOSUS, Leach. *Spiny Shrimp*.—Second pair of legs much shorter than the third pair. Carapace armed with five rows of teeth; abdomen nearly smooth; the third and fourth segments slightly keeled; the fifth, sixth, and seventh channelled.

Plymouth Sound (Prideaux); Falmouth (Cranch); Weymouth (W. Thompson, who observes that its eggs are of a dirty-white, tinged with green); Moray Firth (Gordon); Shetland (Mr. Barlee dredged it off the Haaf in 1851); off Oban (Rev. Alfred Norman).

Mr. Gosse* describes a specimen when alive as being drab or pale wood-brown, with a defined band of opaque white across the fourth segment, a much broader one across

* Ann. and Mag. 1853, p. 384.

the front of the carapace, and an irregular broad white band running down longitudinally on each side, so as to unite these two, leaving an oblong mark of drab insulated in the middle; tail-plates with a transverse drab band; under parts of body and legs spotted with crimson.

CRANGON SCULPTUS, Bell. *Bell's Shrimp*.—Carapace with several raised lines, each of which is armed with two or three small teeth, two spines on the median line, one considerably behind the other; second pair of legs much shorter than the first, with two toes; abdomen distinctly sculptured; third, fourth, and fifth segments sharply keeled; sixth and seventh channelled.

A small species, 7-10ths of an inch long, first described by Professor Bell* from specimens dredged at Weymouth by Mr. Bowerbank. Mr. Gosse† found it there not uncommonly. He says it varies much in colour; in one of its most common conditions the ground-colour is a plain drab, studded with minute blackish dots and stellate specks of reddish-brown; body, especially the abdomen, elegantly clouded with pale sienna-brown in a sinuous but symmetrical pattern; sinuosities in some parts edged with pale blue; and there are three more conspicuous spots of bright azure-

* British Crust., p. 263.

† Ann. and Mag. 1853, p. 155.

blue, set at equal distances along the median line of abdomen, each of them like a half ocellus with a black pupil. An undulating line or macular band of azure crosses the front of the thorax. The projection of the wrist of the anterior foot on each side, like an angular elbow, gives a peculiar look to this *Crangon*.

The Rev. Mr. Gordon says this species is not uncommon in the Moray Firth. The Rev. Alfred Norman informs me that he dredged two specimens in Lamash Bay, Isle of Arran, in five fathoms water with a sandy ground.

CRANGON TRISPINOSUS, Hailst. *Hailstone's Shrimp*.—Carapace with three spines on the thorax, one in the middle, and one on each side. Sometimes one-and-a-half inch long.

Hab. Hastings (Mr. Hailstone), where it was called "Pug Shrimp," Weymouth (Mr. Gosse). Mr. Gosse* describes its manners as resembling those of its congeners, burrowing in the sand, or rather sinking into it, by the rapid displacement of the sand by means of the false feet. When alive, its colour consists of a vast number of ruddy golden stars closely set, interspersed with black and pale specks, on a pellucid grey ground. On the fourth abdominal segment there is a speck of pure opaque white in the median line near its hind

* Ann. and Mag. Nat. Hist. 1853, p. 384.

edge. The eggs, according to Mr. Thompson, are of a light red-green colour.

CRANGON BISPINOSUS, Westw. *Westwood's Shrimp*.—Carapace with two prominent spines, one behind the other; and on each side a row of flat blunt notches.

Hastings (Mr. Hailstone).

FAM. ALPHEIDÆ, M. Edw.

Antennæ inserted on two rows, the inner above the outer. Beak very small and flattened. Legs stout, and scarcely ever showing traces of flabelliform appendage or palpus. First pair of legs very stout and thick; the three last pair of legs always one-clawed.

Gen. 39. ALPHEUS, Fabr.

Carapace prolonged in the form of a hood over the eyes. Beak small and sometimes wanting. Outer pedipalps more or less slender and elongated, broad and somewhat foliaceous at the end. Two first pairs of legs didactyle; the first pair strong, one of them much larger and stronger than the other; second pair weak and filiform, the wrist many-jointed; three last pairs of legs monodactyle.

ALPHEUS RUBER, M. Edw. *Edwards's Red Shrimp*. (Plate VIII. fig. 3.)—Beak small; no spine on outer side of the basal joint of outer antennæ. The large hand with four longitudinal blunt crests, two on its upper margin, and two on its outer face; its lower margin blunt; the movable toe much shorter than the fixed one; a spine on the upper margin of the two arms, at some distance from the end.

Found by Mr. Cocks, of Falmouth, in the stomachs of cod-fish. Mr. Cocks found a perfect specimen, which he gave to the Rev. Alfred Norman. This species must live at a very considerable distance from our coast. The genus is a numerous one in species; they are chiefly found in the tropical seas, particularly in the West Indies and in the Indian Ocean.

ALPHEUS AFFINIS, Guise.*—Deep scarlet colour, except on the chelæ, which are mottled with yellow; median line of carapace prolonged anteriorly into a short beak; supra-orbital vaults each furnished at the end with a minute spine. Front legs unequal, the larger hand having on the upper edge two keels, one behind the other, each terminating in

* Ann. and Mag. Nat. Hist. 1854, p. 278, fig. p. 280. Mr. Guise thinks this may be the *Hippolyte rubra* of Hailstone, on which Mr. Westwood founded the genus *Dienecia*.

front in a small tooth projecting forwards; two keels on the outer surface of the claw, the lower one having a short tooth; the movable finger not shorter than the immovable one, flattened on the sides, and broad at the point; the immovable finger triangular, strong, and forming a kind of socket, into which the opposing finger fits by a tubercle at its end; lesser pincer with a toothed keel on its upper edge, equal in length to the others, but thinner, narrower, and much less robust; second pair of legs didactyle, slender, and having the wrist many-jointed.

Hab. Islet of Herm (Channel Islands).

Gen. 40. AUTONOMEA, *Risso*.

First pair of legs only with two toes. Inner antennæ double, one filament longer and thicker than the other; outer antennæ much longer than the body.

AUTONOMEA OLIVII, *Risso*. *Long-horned Shrimp*.—Body smooth, semitransparent, yellowish. First pair of legs fine red above and clear yellow beneath; outer antennæ whitish.

Mr. Couch records this in his 'Cornish Fauna' with the following observation:—"This species has been hitherto

unknown as British, but I have examined several specimens taken from the stomachs of fishes from the depth of fifteen or twenty fathoms. Some of these were of larger size than described from the Mediterranean; one, not the largest, measuring three inches from snout to tail, with antennæ of the length of five inches" (p. 79).

Gen. 41. NIKA, *Risso*.

First pair of legs dissimilar; one on right side with two toes, one on left with one toe only. Beak very small. Inner antennæ slender and ending in two long filaments. The outer jaw-feet are pediform, long, and stout. The fore legs are stronger than the following.

This is the genus which Dr. Leach described under the name of *Processa*; the first species is the *Processa canaliculata* of that author; the name here adopted is prior to Dr. Leach's, and is given to it from the species being eaten on the coasts of the Mediterranean, as the Shrimp is eaten here.

NIKA EDULIS, *Risso*. *Risso's Shrimp*.—Two-toed hand longer than the wrist, both straight; middle plate of tail grooved down the middle, and furnished above with two pairs of small spines. It is about two inches long.

South coast of Devon, rare. According to the Rev. Mr. Gordon, it is not rare in the Moray Firth.

NIKA COUCHII, Bell. *Couch's Shrimp*.—The two-toed hand shorter than the wrist, the former slightly curved, the latter much more bent; middle plate of the tail not furrowed.

First described by Professor Bell* from a specimen found in Cornwall by Mr. Couch, so well known for his observations on this and other classes of marine animals, in compliment to whom it is named.

Gen. 42. ATHANAS, *Leach*.

Beak simple, small, not toothed on the edges. Inner antennæ with three filaments; mandibles strong, with a palpiform, short, very wide, two-jointed appendage. Eyes not prominent, and yet not covered by the carapace as in *Alpheus*. Tail with outer lamina divided transversely. First pair of legs long and very strong, unequal in size, ending in a thick two-fingered hand, the fingers of which are short and stout.

ATHANAS NITESCENS, Leach. *Montagu's Shrimp*.—Beak sharp, not so long as the peduncles of the inner antennæ; a

* British Stalk-eyed Crustacea, p. 278.

spine on each side at the base. Hands unequal, swollen; second pair of legs with the wrist of five or six joints. Length about an inch.

Coasts of Devon and Cornwall; Moray Firth; County Clare, Ireland.

When alive it is of a dark sea-green hue, and its well-developed pincers give it so much the aspect of a Lobster, that, as Mr. Gosse observes, "it is generally believed, without doubting, by the fishermen, to be the young state of that much-honoured Crustacean. The habit of this pretty little species is to congregate in some small hollow covered by the tide, usually beneath the shelter of a protecting stone; so fond is it of companionship, that if you find one you may pretty surely calculate on more. I have taken, one by one, as many as fifteen out of a hollow hardly more than a foot square."*

FAM. *PALÆMONIDÆ*, *Leach*.

Antennæ inserted on two rows. Beak large, lamellar, compressed, and toothed. Legs stout, without appendages at their base. The two first pairs generally furnished with

* The Aquarium, p. 38.



Sowerby del. et lith.

Vincent Brooks Imp.

1. *Hippolyte spinus*. 2. *Palæmon serratus*. 3. *Diastylus Rathkii*. 4. *Mysis* sp.
5. *Cynthia Flemingii*. 6. *Squilla Desmarestii*.

two toes, but slender. The three last pairs always only one-clawed.

Body laterally compressed and rounded above. This family abounds in species, some of which are pre-eminent for the great length of their fore legs and their large size. The species referred to are found in the tropical seas.

Gen. 43. HIPPOLYTE, *Leach*.

Inner antennæ ending in two many-jointed filaments, one of which is broad and excavated on its lower surface. Abdomen often abruptly bent. Beak very large, fixed, compressed, and generally strongly toothed. Anterior legs with two toes; second pair of legs with the wrist many jointed.

HIPPOLYTE SPINUS.* *Sowerby's Shrimp*. (Plate IX. fig. 1.)
—Base of the beak produced behind into a crest, which is armed with four or five large teeth; the beak itself with many small teeth above. Abdomen very gibbous, its third ring prolonged like a beak over the next joint. Length nearly two inches.

This species is found abundantly in the Arctic Seas.

* *Cancer spinus*, *Sowerby*; *Hippolyte Sowerbæi*, *Leach*.

Mr. Sowerby first described it from a specimen found on the Scottish coast. One was found at Newhaven. Mr. Bell records two specimens as being in his collection, which were dredged by Mr. M'Andrew in deep water off the Isle of Man. The Rev. Mr. Gordon takes it in the Moray Firth; while Mr. Barlee has dredged it off Shetland. The Rev. Alfred Norman writes to me that he has dredged a specimen in deep water with a muddy bottom, off Oban, and that he has seen a second from the same spot, which was taken by Mr. W. Templer: he adds, "I have reason to think that it is not unfrequent in that locality."

HIPPOLYTE VARIANS, Leach. *Leach's Shrimp*.—Beak springing from the front of the carapace, longer than the peduncle of the inner antennæ, with a spine near the base and another near the tip; two (and sometimes three) teeth on the lower edge.

A small species, usually of a clear green colour, but varying much in hue, being often also brown.

Abundant on the South coast and on the Irish coast; found also in the Moray Firth. The Rev. Alfred Norman finds it at Cumbræ and Lamblash Bay. This seems to be the *H. vulgaris* recorded by Dr. Howden as very common in pools at low water in the Firth of Forth, as at Preston

Pans and Crail. The variation in colour generally agrees with the prevailing colour of seaweed in these pools; sometimes it has the red hue of *Delesseria*, at other times it is dark green or light green, and the colour sometimes remains for months after death.*

HIPPOLYTE FASCIGERA, Gosse.† *The Plumed Hippolyte*.—Beak straight, acuminate, with two teeth above, the one at the base and the other near the apex; two teeth below, the one near the middle the other near the tip. Body studded with deciduous tufts of plumes.

Hab. Weymouth Bay. Length 7-8ths of an inch. The most remarkable character of this species is the presence of six tufts of plumose bristles on each segment of the body; each tuft consists of from ten to fifteen plumes, diverging.

It is generally pellucid-white, clouded with opaque drab, and generally blotched with dark reddish-purple.

HIPPOLYTE GRAYANA, Thompson.—Beak long, hollowed out above and below; above, unarmed, with one tooth near the tip; beneath, with three teeth. Abdomen compressed, of even depth as far as the posterior edge of the third segment, and then becoming suddenly very much contracted,

* Dr. Howden, Trans. Roy. Phys. Soc. Edin. Jan. 1853.

† Gosse, Ann. and Mag. 1853, p. 153.

and of almost equal size throughout ; process of third segment very prominent. Colour brown, with a reddish tinge in many places.

Found by Mr. Thompson in Weymouth Bay.

HIPPOLYTE MITCHELLI, Thompson.—Beak straight, acuminate, without a spine on the upper portion ; beneath, with a three-toothed keel and a small tooth near the tip. Of a beautiful, clear, dark green. Length sixteen lines.

Found by Mr. Thompson in Weymouth Bay, in from four to six fathoms water. The Rev. Alfred Norman, in his MS. notes on the British Species, remarks: “ I have met with two *Hippolytes* at Falmouth, in rock-pools at low water, which seem to answer to the description of those which Mr. Thompson of Weymouth has named *Mitchelli*. The rostrum is toothless above ; one specimen has two teeth, and one at the apex below ; the other has three teeth, and one at the apex. Although however my specimens have no tooth at the base above, yet in the place where I have invariably found the basal tooth in *varians*, there may be seen a slight rising in the rostrum. I consider my specimens to be a variety of *varians*. At the same time, I have never, except in one of these two instances, found a specimen of *varians* with four teeth

below; nor have I ever seen one with the basal tooth above absent."

HIPPOLYTE WHITEI, Thompson.—Beak longer than in *H. varians*, not so acute at the tip, with no spine on the ridge, with a minute spine near the tip on the under side, thus making three spines on the under side; carapace less gibbous, and spines on it shorter: outer antennæ with the scale longer and narrower; inner antennæ with the thick filament stouter and more bent. Length, one inch and 2-8ths; the most slender of the British species. A species* first found by Mr. Thompson, at Weymouth, in from four to six fathoms water. It is of a lovely dark meadow-green, with a whitish band running down the carapace; the ova are palish yellow.

HIPPOLYTE CRANCHII, Leach.—Beak short, incurved at the base, with three or four teeth above; the tip with two teeth, the upper the largest, beneath without spines.

South coast of England. Loch Fyne. Mr. Gosse† says it is one of the most common of the smaller Crustacea inhabiting the deeper parts of the coralline zone in Weymouth Bay. He describes its colour when alive as follows.

* Described Ann. and Mag. N. Hist. 1853, p. 110. pl. vi. fig. 1.

† Ann. and Mag. 1853, p. 155.

“The upper parts nearly white, the rest light pellucid purple, in which the blue or the red element prevails in irregular patches. The hue is most positive on the legs, where it is banded; on the terminal segment of the abdomen; on the tail-plates, and on the false feet. The extruded ova, which form a large mass, are white, becoming olive. Sometimes the whole animal is of a pellucid drab hue, with scattered purple specks. A narrow band of whitish drab runs along the median line of the abdomen, and expands into a broad oval spot on the fourth segment.”

Dr. James Howden alludes to a species near this, which is common at Crail in Fife, and was taken in Orkney also by Professor Fleming. He describes it as having a shorter beak, more depressed, and not bidentate at the tip; the wrist of second pair of legs with seven joints, and the central plate of tail as having five pairs of teeth instead of four. (Trans. Roy. Phys. Soc. 1853.)

HIPPOLYTE YARRELLII, Thompson.—Beak short, bent downwards, incurved at the base, with four spinous teeth above; apex tridentate, upper tooth the longest, middle tooth longer than the lower one. Third segment of abdomen more prominent, and running more to a point. Colour brown, blotched with a darker or claret colour. Length 3-4ths of an inch.

Found by Mr. Thompson in Weymouth Bay, in from five to seven fathoms water. The Rev. Alfred Norman writes to me, "I think that this must be added as a synonym to *H. Cranchii*. . . . Great latitude must be allowed to the *Palæmonidæ* in the teething of the rostrum."

HIPPOLYTE THOMPSONI, Bell.—Beak straight, deep, sharp, continuous, with a sharp keel which extends from near the hind margin of the carapace, with eight teeth, four of them on the carapace; beneath, with three minute teeth near the tip. Nearly an inch long.

Described by Professor Bell from a single specimen, obtained by Mr. Thompson of Belfast from the north-west coast of Ireland. Mr. Gosse* found it on the Devonshire coast. He remarks that the denticulations on the upper edge of the beak are not simple serratures, but are triangular spines articulated to the edge.

Mr. Thompson, of Weymouth, observes that the ova are of a dirty green. The Rev. Alfred Norman, in some notes on British Crustacea, with which he has favoured me, remarks, "I have never seen the teeth below so large as they are represented by Professor Bell; they are, in fact, all but invisible to the naked eye. In some specimens preserved

* Ann. and Mag. 1853, p. 155.

dry I cannot see them at all, but I believe they are always present, but are rendered invisible by particles of dust on the rostrum. Most of my specimens are from Lamlash Bay, where it is not uncommon in six to ten fathoms."

HIPPOLYTE BARLEEI, Bate.*—Beak one-third the length of the carapace, the front slightly turned up; the lower margin smooth, the upper armed with four teeth, the two centre of which are partially confluent.

Hab. Sea off the Shetlands (Mr. Barlee). Described by Mr. Bate from a mutilated specimen, the colour of which, when dead, was greenish. It is named in compliment to Mr. Barlee, a gentleman who has been most successful in his exploration of the seas that wash the Shetland islands, where he has discovered many Mollusca and Zoophytes to be abundant, which are either rare or not found in more southern parts of the British seas.

HIPPOLYTE PRIDEAUXIANA, Leach.—A very small species with a straight beak, unarmed above, and with one or two spines beneath in front.

Coast of Devonshire, where it was found by Mr. Prideaux, a correspondent of Dr. Leach, who named this species in compliment to its discoverer.

* Spence Bate, *Ann. and Mag. N. Hist.* 1852, x. p. 357. pl. v. B. fig. 1.

HIPPOLYTE PANDALIFORMIS, Bell.—Beak extending beyond the scale of the antennæ, nearly straight, slightly turned upwards, with seven teeth on the upper and three on the lower edge; eyes very large; abdomen very slender. Length an inch and a half.

Described by Professor Bell from two specimens dredged by Messrs. M'Andrew and Forbes in Loch Fyne, at a depth of about twenty fathoms. The Rev. Alfred Norman has taken five specimens in Lamlash Bay; in some of these specimens there are four or five teeth on the under side of the beak.

The specific name is given to this *Hippolyte* from its great general resemblance to the next genus, *Pandalus*; it is one of those curious species which seem to connect genera, and are so interesting to those who study the philosophy of arrangement in Natural History.

Gen. 44. PANDALUS, *Leach*.

Inner antennæ ending in two many-jointed filaments; outer antennæ very long; the fore legs short, with only one toe. Beak very long, compressed, turned upwards at the end, and toothed both above and below: second pair of legs with two toes and a many-jointed wrist.

The British species, according to Dr. Leach,* is very abundant at Yarmouth, where it is used as an article of food, and is so much esteemed there for the table, as to afford constant employment during the summer season to several fishermen, who take it in abundance at a considerable distance from the shore, and name it from that circumstance the Sea Shrimp.

PANDALUS ANNULICORNIS, Leach. *Ringed-horned Prawn*.—Beak as long as the carapace, front half without teeth, except a small one near the tip. Three last pair of legs armed with spines.

First found by Professor Fleming in Shetland and in St. Andrew's Bay, coast of Devon, and Coast of Norfolk at Yarmouth; Irish coast. The Rev. Alfred Norman has found it at Clevedon in Somersetshire, and in Lamlash Bay in the Isle of Arran.

Mr. Gosse† remarks that the teeth on the upper edge of the beak are triangular spines articulated to the edges; with a fine needle they may be moved to and fro on their articulated bases.

* Mal. Pod. Brit. t. 40.

† Ann. and Mag. 1853, p. 155.

Gen. 45. PALÆMON, *Fabr.*

Inner antennæ ending in three many-jointed filaments. Second pair of legs stronger than the fore pair, and having the wrist of one piece. Beak long and strongly toothed both above and below. Eyes large and prominent.

The species of this genus are much sought after and esteemed for their delicate flavour. When cooked they turn red.

PALÆMON SERRATUS, *Fabr.* *Common Prawn.* (Plate IX. fig. 2.)—Beak extending considerably beyond the lamellar appendage of the outer antennæ; much bent back near the end, and bifid at the tip; the upper margin smooth on the front half, and armed on the posterior part with seven or eight teeth.

A common species on most parts of our coast; it is much sought after as a dainty. Mr. Couch remarks that the largest specimens are found on the rockiest coasts, where it seeks the shelter of large stones and places overhung with weeds. He adds that this species prefers the stillest waters, advancing and retiring with the tide; in summer it prefers water that has a distinct feeling of warmth, and in winter it seeks what is at that season less cold than at the margin,

but never far from land. The Prawn is usually taken with a bag-net suspended from a circular ring of iron at the end of a pole. It is a tempting bait for most sea-fishes. ('Cornish Fauna,' p. 80.)

From one of Mr. Gosse's delightful chapters in his 'Naturalist's Rambles on the Devonshire Coast,'* we extract a few descriptive sentences of the appearance of the Prawn when gliding gracefully along in its native haunts, and not as we generally see it, boiled, on a plate. "The tail-fans are widely dilated, rendering conspicuous the contrasted colours with which they are painted; the jaws are expanded, the feet hanging loosely beneath. Now one rises to the surface almost perpendicularly; then glides down towards the bottom, sweeping up again in a graceful curve. Now he examines the weeds, then shoots under the dark angles of the rock. . . . This Prawn, that comes to our tables decked out and penetrated, as it were, with a delicate pellucid rose-colour, beautiful as he is then, is far more beautiful when just netted from the bottom, or from the overhanging weed-grown side of some dark pool. . . . There he is, . . . with extended eyes, antennæ stretching perpendicularly upwards, claws held out divergently, with

* P. 39.

open pincers ready to seize, and feet and expanded tail prepared in a twinkling to dart backward on the least alarm. Look then at his *cephalo-thorax*, or what you would perhaps call the head, the cylindrical shield that you would pick off as the first essay towards eating him. Its ground-colour is a greenish-grey, but so translucent that we can hardly assign any hue-proper to it; this is marked with several stripes of rich deep brown, running longitudinally, each stripe being edged with buff. Then the body, or more correctly the *abdomen*, is marked with about a dozen stripes of similar colour, but set transversely, girding the segments round with a series of dark lines; and the last segment before the setting on of the tail-fins has three lines running lengthwise again. Now we come to the tail. But here the pen fails; only the pencil could convey an adequate idea of this exquisitely painted organ. The four oval plates that play over each other, and that form a broad and powerful fin when expanded, are bordered with a pale red band; the outer pair have in the centre a red spot, the inner pair a streak of the same hue; each plate has near its extremity a spot of cream white (much larger on the outer pair), made more conspicuous by being broadly margined by reddish-brown. Finally, the plates are studded all over

with red specks, which, when magnified, are seen to be stars. Besides these colours, there are scattered over the body, in symmetrical order, several spots of opaque cream-white, and some of pale chestnut or fawn-brown. And to close this enumeration of colours, the claws and feet are light blue, encircled at regular distances by bands of which half is deep purple, and the other half pale orange. I have not spoken of the fringes of the jaw-plates, nor of those that terminate the tail-fin, but the structure of these is exquisitely fine, especially when examined with a lens."

Mr. Gosse says,* "It is pretty to see the Prawn fed. When a morsel of food is dropped through the water near its head, the excessively long antennæ (especially the long filaments of the superior pair, which are carried perpendicularly upwards) seem principally to take cognizance of its presence and of its qualities. The eyes, though evidently alert, are I think less trusted. As the morsel comes within reach, the second feet, the principal organs of prehension, are stretched out, with the two fingers widely extended; these seize it with the most easy action possible, and in a moment thrust it towards the mouth." Mr. Gosse, at another part of the volume, has shown that the first pair,

* Aquarium, p. 173.

which are shorter and more slender than the second, are used by the Prawn to keep his polished coat of mail scrupulously clean. These front feet "are beset with hairs, which stand out at right angles to the length of the limb, radiating in all directions like the bristles of a bottle-brush. These are the Prawn's washing brushes, especially applied to the cleansing of the under surface of the thorax and abdomen. When engaged in this operation, the animal commonly throws in the tail under the body, in that manner which we see assumed in the pink specimens that are brought to table, which is not however the ordinary posture of life, the body being nearly straight. Then he brings his fore feet to bear on the belly, thrusting the bottle-brushes to and fro and into every angle and hollow with zealous industry, withdrawing them now and then, and clearing them of dirt by passing them between the foot-jaws. The reason of the inbending of the tail is manifest; the brushes could not else reach the hinder joints of the body, and still less the swimming-plates; but by this means every part is brought within easy reach. Sometimes the brushes are inserted between the edge of the carapace and the body, and are thrust to and fro, penetrating to an astonishing distance, as may be distinctly seen through the transparent

integument. Ever and anon the tiny forceipes of the hand are employed to seize and pull off any fragment of extraneous matter which clings to the skin too firmly to be removed by brushing; it is plucked off and thrown away, clear of the body and limbs. The long antennæ and all the other limbs are cleaned by means of the foot-jaws principally."

Mr. Warrington has published in the 'Zoologist' for May 1855, many interesting observations on the Natural History and Habits of the Prawn, and from this account we borrow a passage describing its change of skin. "When the period arrives at which the Prawn is about to throw off its old external covering, it ceases to feed, and seeks about from spot to spot in a restless and fidgety manner, until it has fixed on a locality apparently sufficiently adapted for the purpose required, and suited to its fancy; for this really appears at times to be the case. The third, fourth, and fifth pairs of legs are then stretched out wide apart, and the feet hooked so as to hold firmly upon the surrounding substances, in such a way that the body may be poised and capable of moving freely in all directions, as though suspended on gimbals. The Prawn then slowly sways itself to and fro, and from side to side, with strong muscular efforts, appa-

rently for the purpose of loosening the whole surface of the body from the carapace; the two pair of prehensile or didactylous legs are at the same time kept raised from the ground, stretched forwards, and frequently passed over each other with a rubbing motion, as if to destroy any remaining adhesion; the eyes also may be observed to be moved within their covering by muscular contraction from side to side; and when every precaution appears to have been perfectly taken for the withdrawal of its body from its too limited habiliments, a fissure is observed to take place between the carapace and the abdomen at the upper and back part, and the head, antennæ, legs, feet, and all their appendages, are slowly and carefully drawn backward and out from the dorsal shield, until the eyes are quite clear of the body-shell or carapace, and appear above the upper margin of it; the Prawn, thus half released, then makes a sudden backward spring or jerk, and the whole of the exuvium is left behind, generally adhering by the shell of the six feet to the surface it had selected for its purpose. . . . At the moment the Prawn has been thus liberated from its old envelope, it rolls on the surface of the ground, perfectly helpless, for it is at first evidently so soft that it does not possess the power of supporting its own weight

erect upon its feet, while the beautifully delicate antennæ float from its head like gossamer threads through the water. In a short time, however, it plunges or springs, by a strong muscular exertion of the abdomen, from place to place, stretches its webbed tail and the large paddles of its swimming apparatus, and soon retreats into some dark and sheltered corner, where it remains, continually exercising its various organs, until such a period as the new investing membrane shall have become sufficiently hardened to allow of its venturing forth among its companions without danger, for during all this interval it is liable to their attacks whenever it comes near them, and is obliged, by a series of forcible leaps, rapidly to evade their attempts, and escape out of their way. When the newly-coated *Palæmon* first makes its exit from its hiding-place, its appearance is doubly beautiful; the colours are so clear and bright, particularly the orange and rich brown bands which encircle the pale blue prehensile feet, the various markings are so defined, and the small spines and fringes of hair so clean and well developed, and the deportment of the creature itself is altogether so bold and vainglorious, as though proud of its new vesture, that it cannot but command the admiration it seems to seek."

PALÆMON SQUILLA, Linn. sp. *White Shrimp*.—Beak not extending beyond the lamellar appendage of outer antennæ, nearly straight, and toothed above throughout with from seven to eight teeth, while there are three or four below.

A much smaller species than the *P. serratus*, and apparently not uncommon on our coasts. The Rev. A. Norman tells me he takes it off the Isles of Cumbrae and Arran, and at Falmouth and Land's End, in rock-pools. Other species beside this are named "White Shrimp."

PALÆMON VARIANS, Leach.—Beak quite straight, tip entire; above with four to six teeth, beneath with only two.

Not a common species; it is met with on the coasts of Devon and Dorset, and is also taken on the Irish shore. The Rev. Alfred Norman finds it off the coast of Guernsey, and in a note he kindly informs me, "I have taken this species in great abundance at Clevedon, in a ditch far above ordinary high-water mark, of which the water was scarcely at all brackish; it was in company with myriads of *Rissoa ventricosa*. I found some also further up in a stream of clear running water, along with *Aplexus hypnorum* and other fresh-water shells."

PALÆMON LEACHII, Bell.—Beak nearly straight, with

five or six teeth above and three beneath; one only of the former situated behind the line of the eye-notch; tip generally emarginate.

Described first by Professor Bell* from specimens found in Poole Harbour; Mr. W. Thompson finds it at Weymouth in spawn in June; the ova are of a brownish-drab colour. The beak is covered with innumerable reddish dots.

FAM. *PENÆIDÆ*, *M. Edw.*

Antennæ inserted on two rows; the lower, if not both pairs, generally very long. Beak small or wanting. Legs slender, their base almost always furnished with a more or less developed lamellar appendage; third pair of legs often furnished with two claws. Abdomen very long and compressed.

There are but few species of this family found in our seas; there are many species in the warmer parts of the world, many of them found in the estuaries of rivers, and highly esteemed as food.

* British Stalk-eyed Crustacea, p. 307.

Gen. 46. PASIPHÆA, *Savigny*.

Beak very short and simple; the carapace much narrower in front than behind; peduncle of inner antennæ slender and ending in two many-jointed threads. First and second pairs of legs two-toed, rather stout, and nearly of equal length, armed with spines on their third joint; the three following pairs of legs very slender, one-toed, and more or less adapted for swimming; the fourth pair generally the shortest. Abdomen much compressed on the sides, and very long; the false legs of the first ring end in a single plate, the four following pairs have each two short swimming plates.

PASIPHÆA SIVADO, Risso. *Sword Shrimp*.—Outer plates of the tail-fin much longer than the inner pair, which are longer than the central piece.

Found at Bridgewater by Mr. Baker, and off the Irish coast by the Rev. J. Bulwer. Specimens from the British Channel were sent to Professor Bell by Mr. Baker, and two were found by Mr. M'Andrew in the Irish Channel, which he gave to Professor Bell.

This Shrimp is very much compressed, and the body, when alive, is white and transparent, each joint being

banded with red; the eyes are black; the antennæ and legs are red, and the tail-plates are dotted with red. I am indebted to the Rev. Alfred M. Norman for the following note. "This beautiful Crustacean occurs in the British channel at Clevedon, occasionally in great abundance. It was called by the fishermen who procured them for me, 'the White Shrimp.' It is taken in nets suspended from poles, and placed near the mouth of the little stream that runs into the channel at 'the Pill;' these nets are set to take Shrimps, Sprats, and other fish, which the tide as it goes out leaves in them. Although the fisherman is always on the spot to secure his fish as the tide recedes, he assures me he has never once seen a *Pasiphæa* alive. I conclude therefore that they cannot bear exposure to the air, and die instantly on leaving the water. Colour white, and the appearance jelly-like; the antennæ, articulations of the abdomen, pedipalps, hands, and caudal laminae are more or less coloured with rich crimson, as Risso has described Mediterranean examples. It is a most lovely and remarkable species."

Gen. 47. PENÆUS, *Fabr.* sp.

Body much compressed; inner antennæ short, first joint

of upper antennæ very large and excavated above, so that the eyes can lodge in the cavity; carapace with a crest down the middle, and a groove on each side of this crest.

First, second, and third pairs of legs two-toed; the wrist of fourth and fifth pairs of legs not ringed. The false abdominal legs terminating in two ciliated plates. The tail-fin long, its middle plate triangular and grooved beneath down the middle.

PENÆUS CARAMOTE, Risso, sp. *Davies' Grooved Shrimp*.
—Beak shorter than the peduncle of upper antennæ, with twelve teeth on its upper edge, and beneath with one. There are three grooves on carapace, one on each side of beak, and a third shorter one separating the two grooves on the posterior part of carapace.

British coast, very rare, taken on the coast of Anglesea by the Rev. H. Davies. It is a common species in the Mediterranean, where it attains the length of seven inches.

ORDER II. STOMAPODA, *Latr.*

In the species of this curious order, the branchiæ are always external, and not lodged, as in the preceding order, in inner chambers of the carapace. These gills, instead of

being composed of plates or of simple filaments, are composed of cylinders arranged parallelly, from which arise other smaller cylinders, and these in their turn are also ciliated. There are seven, and in some cases eight, pairs of legs; and as they are often near the mouth, the name of the Order has been derived from this circumstance.* There are generally six pairs of abdominal appendages.

Species of three families of this Order have been found on our coasts, but those belonging to the families *Squillidæ* and *Phyllosomadæ* can scarcely be regarded as indigenous. Some of the exotic species of *Squilla* are very large and striking, while the transparent *Phyllosomata* and curiously spined glassy *Erichthus* and *Alima* are among the most wonderful of all the Crustacea. The species of the family *Mysididæ* are often very abundant, and in some parts of the world are important to man. One species, *Mysis flexuosus*, is thus referred to by Sir James Clark Ross;† “It inhabits some parts of the Arctic Ocean in amazing numbers, and constitutes the principal food of the prodigious shoals of Salmon that resort thither in the months of July and August, and upon which the inhabitants of

* Στομα, a mouth; and πους, ποδος, a foot.

† Appendix to Ross's Second Voyage, p. 85.

Boothia depend in a great measure for their winter store of provisions. It is also the chief food of the whale, by which such a prodigious quantity of fat is produced in the body of that immense animal. During the summer they assemble in vast myriads at the mouths of rivers, but in the winter they are more generally distributed along the whole line of coast, and, together with the *Argonauta arctica*, are to be seen in every crack that opens with the tide, even at the coldest period of the year."

FAM. MYSIDIDÆ, M. Edw. OPOSSUM SHRIMPS.

All the legs of the same form, and fitted for swimming. Thorax thick and compressed on the sides. Carapace with the margins folded under at the base of the legs, and nearly concealing all the thoracic ring. Abdomen much developed; there are six or eight pairs of thoracic legs, which are provided with a well-developed palpus, which makes them appear double.

Gen. 48. MYSIS, Latr.—(Plate IX. fig. 4.)

No thoracic branchiæ. One or two pairs of foot-jaws; hind feet complete. False abdominal feet very small, and without branchial appendages, the last two feet furnished

with them ; in the male this appendage is very small, but in the female it is greatly developed, and the two form a pouch in which the eggs are deposited and the young are hatched, hence they have been named Opossum Shrimps, from this pouch somewhat resembling in use the pouch of the Marsupial animals.

These Opossum Shrimps are frequently met with in countless myriads towards the surface of the Greenland Sea. They seldom approach the shore or retire to the lower part of the ocean. Otho Fabricius, in his 'Fauna Grœnlandica,'* which is a model for a work of that nature, has described three species ; two of these (*Mysis pedatus* and *M. oculatus*) called *Illœrak* and *Irsitugak* by the Greenlanders, small though they be, form the chief part of the food of the common Whale (*Balœna mysticetus*). As he remarks (p. 33), it is, at the first thought, truly wonderful that so large an animal should be supported and acquire so much fat from so slender and trifling a subject ; but when one reflects on the abundance of them being so great that the Whale, when it opens its mouth, must draw in many thousands at a gulp, the wonder is diminished. The little shrimps seem to play about the fringes of the "whale-

bone," and swimming about them freely, seem to enter the gullet as it were of their own accord.

Its swimming-feet are in continual motion, the walking feet remaining fixed; it moves along with its body in a horizontal line, but occasionally jumps like a little Shrimp.

MYSIS CHAMÆLEON, Bell.—Middle plate of the tail bifurcate; beak blunt, not more than one-third the length of the eye-stalk.

Abundant on our coasts, as at Weymouth (Professor Bell); Moray Firth (Rev. G. Gordon); Firth of Forth, Cumbræ, Lamash Bay, rock-pools. Channel Islands (Rev. A. Norman).

It varies much in colour, from grey to green and brown; and according to Mr. Norman, is "certainly by far the most common species of the genus."

MYSIS LAMORNÆ, Couch.*—Beak bluntly triangular; middle plate of tail deeply bifurcate, and about half as long as the second; antennal scale reaching beyond the peduncle of inner antennæ. Small and stout species, generally of a deep arterial blood-colour; a very light and active species.

Mount's Bay.

MYSIS VULGARIS, J. V. Thompson.—Middle plate of

* Zoologist, Oct. 1856, p. 5286.

tail lanceolate, with the apex pointed; beak short, bluntly triangular; antennal scale, nearly as long as the carapace. Ireland, abounding in the river Lee (J. V. Thompson); Weymouth (W. Thompson, who observed its ova to be brownish); Bay of Findhorn and Canal of the Loch of Spynie (Rev. G. Gordon, who observes that in this locality, in the autumn months, a continuous line of this species may be observed miles in length). Arnold's Pools, Guernsey (Rev. A. Norman).

MYSIS PRODUCTUS, Gosse.* *Long Opossum Shrimp*.—Elongate, slender. Beak lanceolate, nearly twice as long as the eyes. Peduncles of inner antennæ elongate, curving outwards; second and third joints together as long as the first. Scale of outer antennæ about half as long as the carapace, strongly toothed.

Weymouth Bay.

Colour pale umber-brown, redder towards the tail, outer tail-plate hyaline, with a large stellate spot of red on its basal half. Eyes black.

MYSIS GRIFFITHSIÆ, Bell.—Middle plate of tail lanceolate, contracted near the base, tip pointed; beak lanceolate, much longer than eye-stalks; antennal scale scarcely longer than beak.

* Ann. and Mag. Nat. Hist. 1853, p. 156.

Torquay (Mrs. Griffiths); Weymouth (W. Thompson, who observed it in spawn June 14, 1853).

MYSIS OBERON, Couch.* — Beak bluntly triangular, reaching as far as the circumference of the cornea; middle plate of tail lanceolate, tip rounded, and the rounded portion with two diverging teeth.

Mount's Bay (Couch).

"A perfectly translucent species, the large black eyes being the chief points by which it can be detected. It is very graceful in its movements, and unless when much disturbed it hovers very quietly and elegantly about and among the bunches of pendent seaweed; but when disturbed it instantly seeks shelter, either at the bottom or in some crevice."

MYSIS, n. s. (Plate IX. fig. 4.) — Antennal scale much longer than eye-stalk. When alive so transparent that in a tumbler of water nothing scarcely can be seen but its black eyes. None of the other species are so. It is much smaller than any of them.

Falmouth (rock-pools at), Rev. A. Norman, April 1855.

* Zoologist, Oct. 1856, p. 5284, and figure.

Gen. 49. MACROMYSIS.*

Upper antennæ armed with a scale. First, second, and fifth segments of the abdomen bearing fins like the *Mysis*, third and fourth with the peduncles biarticulate, and each peduncle giving off two branches; the outer branch of the fourth very long and slender, semi-articulated.

MACROMYSIS LONGISPINOSUS, Goodsir.—Whole body of a dark yellowish or greenish colour. Beak very short, but sharp-pointed; upper antennal scale of the same length as the last joint of the peduncle; lower antennal scale twice as long as the peduncle, three-quarters of an inch long.

Firth of Forth (Goodsir).

MACROMYSIS BREVISPINOSUS, Goodsir.—Whole body of an opaque white, with a row of black spots down the back of the abdominal segments. Beak of considerable length, but not sharp; upper antennal scale not so long as the peduncle; lower antennal scale four or five times as long as the peduncle. Length an inch.

Firth of Forth (Goodsir); Bangor, County Down (W. Thompson). This species and the preceding were discovered and described by Henry Goodsir, who accompanied Sir John

* Themisto, *Goodsir*.—Edin. New Phil. Journ. 33. A name previously employed by Guérin Méneville for a genus of Crustacea.

Franklin on the voyage of the 'Erebus' and 'Terror.' He and his companions must have long ago perished in the inclement regions where their ships have been so long frozen in; but it is hoped that the journals may yet be recovered. Goodsir, by a letter received from one of the party, had been busily engaged dredging in the Arctic seas, and many a valuable observation on Crustacea (his favourite subject) has been lost to science.

Gen. 50. CYNTHILIA.*

Subabdominal fins composed of two joints; four last fins with the terminal plume double, with an opaque, bifurcate, and convolute organ rising between each.

CYNTHILIA FLEMINGII, Goodsir. (Plate IX. fig. 5.)—Whole body of an opaque straw-colour, with the netted portion of the eyes black. Lower antennal scale nearly twice as long as the peduncle. Beak slender and finely pointed; edges of middle plate of the tail spined. Length, eight lines.

Firth of Forth. This was found and described by the

* *Cynthia*, J. V. Thompson. Name preoccupied and changed to *Cynthia*.

late Henry Goodsir, who named it after the Rev. Dr. Fleming, Professor of Natural History in New College, Edinburgh. He found it in shallow water.

A species of the genus *Thysanopoda* has been found in Britain—the *T. Couchii*: the gills in this are in the form of plumes at the base of the feet; the last pair of feet are unbranched. The type of the genus was found in the Atlantic Ocean. Professor Bell thus characterizes the

THYSANOPODA COUCHII, Bell.—Branchiæ with only one series of leaflets. Middle point of the trifid apex of the central caudal lamina not half the length of the lateral ones.

Cornish coast (Mr. Couch); found in the stomach of a mackerel.

FAM. *DIASTYLIDÆ*, Spence Bate.

Gen. 51. *DIASTYLIS*, Say.

Carapace produced in front as a beak. Eyes confluent on the top. Five segments of thorax exposed behind carapace. Upper antenna short, scarcely reaching to the fore margin of carapace. Lower antenna longer than the upper. First five abdominal segments without appendages,

the sixth furnished with two limbs, ending in double stylets; central tail-piece long, produced into a style. A curious genus, the first character in the general appearance of which, as Mr. Spence Bate remarks in his elaborate Paper,* is that of its being a mutilated creature; the reduced form of the members generally gives the species the appearance of wanting many of their limbs. Agassiz and others have said that these creatures are the young of certain genera of *Macroura*, such as *Alphæus*, *Palæmon*, and *Hippolyte*, but Mr. Harry Goodsir has clearly shown that they are adult animals, perfect in themselves; and that they belong to the *Stomapoda* is proved by Mr. Bate, notwithstanding their being sessile-eyed.

Mr. Goodsir remarks that the various species swim with very great rapidity; and on stopping, they fall to the bottom on the sand or gravel, without attempting to lay hold of anything, seldom using their feet as a means of prehension. He has often placed the point of a needle on their thorax, and pressed them down into the sand; the animal immediately frees itself, with very little apparent trouble, by means of its tail. The end of this is placed against the needle, with one of the styles on either side of it, and by pressing

* Ann. and Mag. Nat. Hist., June 1856.

upwards in this way, it soon regains its liberty. They are found on sandy banks, chiefly frequenting those where there is a little seaweed. Mr. Bate adds that the larva quits the pouch in a form closely resembling that of the parent. He has obtained the young of two British species, a *Cuma* and *Diastylis*.

DIASTYLIS RATHKII, Kroyer, sp. (Plate IX. fig. 3.)—*Alauna rostrata*, Goodsir.—When alive, of a beautiful bright straw-colour, inclining to yellow.

Hab. Firth of Forth (Goodsir); Moray Firth (Rev. G. Gordon); Arran, St. Ives (Barlee); Falmouth (Webster); Plymouth.

Gen. 52. CUMA, *Edwards*.

Carapace not produced into a beak in front. Four segments of thorax complete, and exposed behind the carapace. Upper antennæ single-jointed and scale-like, lower short. Abdomen, sixth joint with double-branched stylets. Centre tail-piece wanting.

CUMA SCORPIOIDES, Montagu, sp.—When alive, of a fine straw-colour, delicately tinged with pink, which is brighter in certain lights; shell rough with shallow foveæ.

Devonshire (Montagu); Firth of Forth (Goodsir); Moray Firth (Rev. G. Gordon).

CUMA EDWARDSII, Kroyer; Spence Bate.—Less compressed than the last, more pointed in front, and five segments behind the carapace.

Weymouth (Professor Williamson).

Gen. 53. EUDORA, *Spence Bate*.*

This differs from *Cuma* in having the upper antenna obsolete, lower antenna very short, consisting of a peduncle of three joints, and a filamentous terminal appendage.

EUDORA TRUNCATULA, Spence Bate.—The lateral angles of the carapace meet in front of the antennal segments, and are somewhat raised above them. The lower front edge is considerably produced, and gives a truncated character to the appearance of this species; its margin is serrated.

Plymouth Sound, within the Breakwater; sent to Mr. Bate by W. Webster, Esq. Some of the specimens had eggs in the incubatory pouch.

* Ann. and Mag. Nat. Hist., June 1856.

Gen. 54. HALIA, *Spence Bate*.

Carapace elongated, compressed, covering the thorax, except the three posterior segments. The four hind legs without an appendage. Central tail-piece rudimentary. Upper antenna prominent, lower membranaceous.

HALIA TRISPINOSA, Goodsir, sp.—Carapace long, much compressed, its dorsal ridge surmounted by two or sometimes three spines; the ambulatory division of the first pair of legs extremely short; the second thoracic segment well developed.

Firth of Forth (Goodsir); Moray Firth (Rev. G. Gordon).

Gen. 55. BODOTRIA,* *Goodsir*.

First to fifth abdominal segments each armed with a pair of bifurcated finlets. Two terminal scales of caudal fins single-jointed.

BODOTRIA ARENOSA, Goodsir.—Carapace nearly oval, beak wanting; upper antennæ quite obsolete, lower of considerable length, ending in two long spines. Length five lines.—In the Firth of Forth (Goodsir).

* The Latin name for the arm of the sea in which Mr. Goodsir found the species.

Gen. 56. VENILIA, *Spence Bate*.

Carapace with the lateral angles meeting in front of antennal segments. Two pairs of well-developed antennæ. Five hind segments of thorax exposed. Central tail-piece rudimentary.

VENILIA GRACILIS, *Spence Bate*.—Carapace long and narrow, each of the five front abdominal segments with a pair of swimming feet.

Moray Firth (Rev. G. Gordon).

FAM. SQUILLIDÆ, *M. Edw.*

Body long and generally depressed. First pair of thoracic legs very large, and adapted for seizing and securing their prey, the last joint folding upon the other and strongly armed; the next three pairs much smaller and generally placed on the mouth, appearing to serve for holding their food: they terminate in an oval hand, armed with a movable fang; the three next pairs slender, cylindrical. Carapace divided into three lobes; a rostral movable plate and well-developed gills.

Gen. 57. SQUILLA, *Fabr.* MANTIS SHRIMP.

The three last pairs of legs with a long styliform appendage; the fang of the great first pair of legs lamellar, and strongly toothed on the inner margin.

The *Squilla* of zoologists are not the *Squilla* of the ancients, but a genus of remarkable long Crustacea with large eyes, curiously shaped, and fore legs with a spined claw which they can fold against the arms; a long, but small carapace, which contains chiefly the parts of the mouth, the antennæ and appendages, while the stomach, viscera, and branchiæ are disposed in other parts of the body. The stomach occupies the four segments which follow the carapace; the branchiæ are behind, on the under side of the body, and nearly quite exposed. The abdomen is long, with very distinct joints, the two last segments often curiously spined and grooved, while the appendages at the end can be spread out much like the tail of a lobster, and must assist the creatures much in moving; their legs, except the first pair, are feeble.

In the Mediterranean they are called Sea Mantises, or *Prego-Dieu*, from their fore legs resembling the corresponding parts in the well-known group of insects called

Mantis. The fishermen in Provence, from their having apparently a greater number of legs than other Crustacea, and from their long, jointed bodies somewhat resembling those of the centipede, call them *Galero*, which means many-legged, or *Scolopendra*.* The species found in the Mediterranean are generally found at considerable depths; they live in sandy places where they can easily procure their food, which seemed to M. Roux to consist chiefly of annelids and fragments of the *Actinia effæta*.*

According to Risso, the females, when they wish to deposit their eggs, which they have under their abdominal appendages, retire to rocky places. The *Squillæ* are timid, avoiding danger; they swim much after the fashion of Lobsters.

SQUILLA DESMARESTII, Risso. (Plate IX. fig. 6.)—Carapace scarcely ridged; rostral plate elongated and rounded in front; fang of first pair of legs with five teeth. Abdomen smooth and swollen in the middle, and with three longitudinal crests on each side. It is of a yellowish colour dotted with brown, but is sometimes of a delicate rosy hue. Length about four inches.

Off Brighton and Cornwall, and at Guernsey. Dr. Lukis,

* Roux, Crust. de la Médit. pl. v.

in 1856, told me of two living specimens which had been taken at Herm and Jethou. On the French coast it does not appear that this is a very rare species.

Dr. Lukis* has published the following observations on the habits of a specimen which he kept alive in a basin of sea-water for two days. "It sported about, and, after a first approach, exhibited a boldness rather unexpected. When first alarmed, it sprang backwards with great velocity; after which it placed itself in a menacing attitude which would rather have excited the fear of exposing the hand to it. The prominent appearance of the eyes, their brilliancy and attentive watching, the feeling power of the long antennæ, evinced quick apprehension and instinct. I brought a silver teaspoon near them, which was struck out of my hand with a suddenness and force comparable to an electric shock: this blow was effected by the large arms, which were closed, and projected in an instant with the quickness of lightning. An apparent anxiety to keep the head and claws in front, made me suspect that the animal lodges its hinder part in holes or recesses, from which it can strike at its prey or other passing objects."

SQUILLA MANTIS, Rondelet, sp.—Fang of first pair of

* Mag. of Nat. Hist. viii. p. 464.

legs with six long teeth ; abdomen above with eight longitudinal rows of small prominent crests.

Cornwall, first recorded as found in the British seas by Professor Bell, who obtained a specimen from Mr. Couch, which was procured about a couple of leagues from the shore, where the bottom was rocky with some spots of sand. When alive it is of a very pale yellowish-grey. Mediterranean specimens attain the length of six or seven inches.

Dr. Lukis found on the coast of Guernsey a species of *Phyllosoma*, which he has described under the name of *P. Sarniense*. The species of this remarkable genus, when alive, are transparent like crystal, and are very flat ; the legs are very long and slender, while the eyes are on long stalks. A species of the genus has been met with in the Mediterranean, but it is in the tropical seas that these curious creatures occur most abundantly ; the eyes are blue, and contrast strikingly with the glassy transparency of the rest of the body. Dr. Lukis informed me in the summer of 1856, that three living specimens of this glassy *Stomapod* had been taken floating near the surface.

DIVISION EDRIOPHTHALMA, *Leach*.

In the Crustacea of this division the eyes are sessile, that is, are not elevated on foot-stalks, while the body is more or less distinctly divided into three parts; the different parts of which the thorax and abdomen consist are almost always very distinct from each other, and movable. There is no great dorsal shield corresponding to the carapace of the *Podophthalma*, neither do they breathe, like the latter, by means of gills, but by the aid of a portion of their limbs, the structure of which is wholly or partially modified for this special purpose.

The animals of this division are small in size and mostly found in the sea or on its shores, where they abound; and by the removal of decaying animal and vegetable matter, they effect great good, while they afford ample stores of food to many fishes and sea-birds.

ORDER AMPHIPODA.

The abdomen, in the species of this order, is always well developed, and furnished with five to six pairs of limbs. The head is formed of a single segment, and has generally only two sessile eyes and two pairs of antennæ, though in a

few instances there are four eyes, and in one genus only a single pair of antennæ; the mandibles are furnished with a palpus. There are branchial vesicles under the thorax; the first five pairs of abdominal limbs differ in form, and are used in locomotion. The females carry their eggs beneath the thorax, frequently in flabelliform appendages fixed to the base of their legs.

The species are all small; Professor Edwards knew not any that was longer than eighteen lines, but they make up in numbers for any deficiency in size. They are found in every sea. Some of them abound in the Arctic regions, and as an instance of their voracity and abundance, Dr. Sutherland* mentions that in Davis's Straits he has seen an entire seal reduced to a perfect skeleton in less than two days by the attacks of the *Gammarus arcticus*; he adds, "I observed a dead seal in the water, which an Esquimaux had been towing for three hours. A great number of these active little creatures were in the water around it, and they could be seen going in the direction of one of the wounds in the skin, by which they entered a large chamber which they had hollowed out beneath in the flesh and blubber, of which they are very fond." The arrangement of *Amphi-*

* Voyage in Baffin's Bay and Barrow's Straits, i. 142.

podia, which is here adopted, is mostly from Mr. Spence Bate's Synopsis in the February number of the 'Annals and Magazine of Natural History.' That gentleman has made the Order his special study, and has added many genera and species to our Marine Fauna.

FAM. ORCHESTIDÆ.

Adapted for leaping. Mandibular palpus wanting. Body compressed; epimera broad. Two shortish posterior caudal appendages. Upper antennæ shorter than basal joints of lower antennæ.

Gen. 58. TALITRUS, *Latr.*

First pair of feet simple in both sexes. Second pair of feet not subcheliform; upper antennæ shorter than the two basal joints of the lower ones. Lower antennæ long.

The species of this genus live in great companies, and prey on garbage stranded on the coast, devouring quickly both animal and vegetable matter. They can dig into the sand with their fore feet.

TALITRUS LOCUSTA. *Common Sand-hopper*.—More or less of a horny colour. Antennæ reddish; those of the male longer than the body. Second pair of legs much smaller

than the first, feeble; fifth joint smaller than the fourth, flattened, rounded at the end.

Common on all our sandy coasts, where it forms the principal food of the ringed plover and many shore birds. Colonel Montagu remarks that it is one of those creatures whose service is most apparent in contributing to the clearing away of putrid matter.

It is to this species Archdeacon Paley alludes in the 26th chapter of his 'Natural Theology,'* as an instance of the abundance of happiness in the lower creatures. He says, "Walking by the sea-side, in a calm evening, upon a sandy shore, and with an ebbing tide, I have frequently remarked the appearance of a dark cloud, or rather very thick mist, hanging over the edge of the water, to the height perhaps of half a yard, and of the breadth of two or three yards, stretching along the coast as far as the eye could reach, and always retiring with the water. When this cloud came to be examined, it proved to be nothing else than so much space filled with young *Shrimps*, in the act of bounding into the air from the shallow margin of the water, or from the wet sand. If any motion of a mute animal could express delight, it was this; if they had meant

* P. 458, 12th ed.

to make signs of their happiness, they could not have done it more intelligibly. Suppose then, what I have no doubt of, each individual of this number to be in a state of positive enjoyment, what a sum, collectively, of gratification and pleasure have we here before our view !”

Mr. Halliday has observed* a small beetle, *Cillenum laterale*, feeding on this Sand-hopper. It seizes them by the soft parts of the under side, and in this way, though the beetle be very small, it is able singly to master game many times its own bulk. Sometimes three or four beetles may be found together attacking a *Talitrus* of the largest size.

Gen. 59. ORCHESTIA, *Leach*.

First and second pair of feet subcheliform; upper antennæ shorter than the two basal joints of the lower ones. Jaw-feet blunt at the tip. First pair of legs much smaller than second pair, simple in neither sex.

ORCHESTIA LITTOREA, *Leach*. *Shore-jumper*. (Plate X. fig. 1.†)—When alive, yellowish-brown; the body smooth,

* Ent. Mag. iv. 252.

† We are indebted to the kindness of Mr. Spence Bate for the original drawings of Plate X.



Sowerby del. & lith.

Vincent Brooks Imp

1. *Orchestoidea lutea* var. 2. *Montaguia imbecilloides* 3. *Anonyx Edwardsii* 4. *Teuromastus typicus* 5. *Westwoodia caecula* 6. *Iphimedia obesa* 7. *Dexamine spinosa* 8. *Jassa pelagica*.

glossy. Head small. Hand of first pair minute, subcheliform in both sexes; hand of second pair of feet very large in male, feeble in the female; front edge oblique, convex.

Common on our sandy coasts, and having the same habits as the *Talitrus*.

ORCHESTIA DESHAYESII, Audouin.—Hands of second pair of legs strongly arcuate above; their front edge very oblique, concave, and ending in a prominent pointed tooth, so as to be almost semilunar.

Rare on the southern coast (Plymouth).

ORCHESTIA LÆVIS, Spence Bate.—Second hand in the male long and triangular, and without a thumb or tooth on the palm.

Found at Swansea by Mr. Spence Bate, who first described it.

Gen. 60. ALLORCHESTES, Dana.

Upper antennæ about half the length of the lower; the basal joints of the lower not completely fused into the facial wall of the head. Olfactory spine rudimentary. First two pairs of feet subcheliform; mandible without palpi.

ALLORCHESTES DANAI, Spence Bate.*—Upper antenna

* Annals and Magazine of Nat. Hist., Feb. 1857.

reaching to the end of the peduncle of the lower; the lower one-third the length of the animal. First pair of feet considerably smaller than the second; hind edge of the palm of the latter ending in a blunt point.

Found at various parts of our coast. Mr. Bate has had it sent from the Moray Firth by the Rev. Mr. Gordon, and from Penzance and Falmouth by Messrs. Barlee and Webster.

ALLORCHESTES IMBRICATUS, Spence Bate.—Upper antennæ longer than the peduncle of the lower; central edge of the dorsal surface keel-shaped; each of the segments surmounted by a small tubercle.

Penzance (Mr. Barlee).

Gen. 61. GALANTHIS, *Spence Bate*.

Lower antennæ scarcely longer than the upper; mandibles without palpi. Telson divided.

GALANTHIS LUBBOCKIANA, Spence Bate.—Hands of both pairs of jaw-feet subcheliform and subequal.

Found by Mr. Webster at Falmouth, and by Messrs. Harris and Barlee at Penzance.

FAM. *GAMMARIDÆ*.

Adapted for swimming; mandibles with a palpus. Body generally compressed. Antennæ ending in a flagellum, not like legs. Two posterior caudal appendages sometimes short. Legs long and slender. The antennæ assist the *Gammari* very much in obtaining the minute particles of food which abound in the water. Say* describes a species as striking an object of a proper size, when it comes within a moderate distance of its mouth, into the grasp of the four front feet, the first pair of which seem to be most employed.

Gen. 62. OPIS, *Kroyer*.

First pair of legs armed with claws of great size; second pair of legs not subcheliform; upper antennæ with an appendage, and thick at the base.

A species of *Opis*, said to be *O. typica*, has been found in Ireland (Strangford Lough, W. Thompson). This was picked off Algæ brought up from a depth of fifteen to twenty-three fathoms, where they grew on soft sandy ground.

* Journal of the Acad. Nat. Sc. Phil. i. p. 375.

Gen. 63. MONTAGUA, *Spence Bate*.

Antennæ nearly equal in length ; upper without secondary appendage ; mandibles without palpi. Hands of both jaw-feet subcheliform ; coxæ of four front legs very much developed ; posterior false feet single-branched. Telson entire.

In memory of the late Colonel Montagu, one of the most eminent naturalists, who discovered and described so many British animals.

MONTAGUA MONOCULOIDES, Montagu, sp. (Plate X. fig. 2.)—Second joint of the peduncle of the upper antennæ shorter than the first ; palm oblique, occupying only half the length of the hand.

Found by Montagu on the South Coast of Devon, and at Plymouth by Messrs. Stewart and Bate.

MONTAGUA MARINA, Spence Bate.—Palm nearly the whole length of the lower side of the hand.

Macduff and Banff (whence it was sent to Mr. Bate by Messrs. Gregor and Edwards), and also at Plymouth.

MONTAGUA ALDERII, Spence Bate.—Hand square, furnished with a small thumb ; palm denticulated.

Northumberland coast (Mr. Alder).

MONTAGUA POLLEXIANA, Spence Bate.—Hand of second jaw-foot furnished with a large thumb, which is formed by a deep cleft in the palm.

St. Ives (Mr. Barlee).

Gen. 64. DANAIA, *Spence Bate*.

First pair of jaw-feet simple ; last pair of false feet with a single stylet.

Named in compliment to Mr. Dana, the American naturalist, whose labours as a student of Crustacea are almost incalculable.

DANAIA DUBIA, Spence Bate.—Coxæ of the second, third, and fourth pairs of legs denticulated at the margin.

Mr. Bate has not mentioned the locality of this species.

Gen. 65. LYSIANASSA, *Milne-Edwards*.

Upper antennæ short, pyriform, furnished with a secondary appendage. First jaw-foot simple, second long and feeble. Telson simple.

LYSIANASSA COSTÆ, M. Edw.—This species, in which

the lower antennæ is scarcely longer than the upper, has been found at Plymouth by Mr. Spence Bate.

LYSIANASSA AUDOUINIANA, Spence Bate.—Lower antennæ much shorter than the upper; filamentary appendage to the upper rudimentary.

Plymouth (Mr. Spence Bate).

LYSIANASSA CHAUSICA, Milne-Edwards.—Lower antennæ longer than the upper, and longer than the entire animal.

Plymouth (Mr. Spence Bate).

LYSIANASSA MARINA, Spence Bate.—Lower antenna longer than the upper, but not half so long as the entire animal.

Plymouth Sound (Mr. Spence Bate); Banff (Mr. Edwards).

Gen. 66. SCOPELOCHEIRUS, *Spence Bate*.*

Upper antennæ furnished with a secondary appendage. First pair of jaw-feet ending in a brush,† second cheliform. Telson double.

SCOPELOCHEIRUS CRENATUS, Spence Bate.—Head fur-

* Ann. and Mag. Nat. Hist. Feb. 1857.

† Hence the generic name, from *σκοπηλος*, a brush, and *χειρ*, the hand.

nished with a small beak ; upper antennæ very large at the base ; secondary filament consisting of but one joint ; a deep notch in the ninth segment from the head.

Widely distributed, as it has been found by its describer at Plymouth, and by Mr. Edwards at Banff.

Gen. 67. ANONYX.

First and second pairs of legs subcheliform ; the upper antennæ with an appendage, and thick at the base. Telson scale-like, with a central division.

ANONYX ALBUS. A small species, of a white colour ; has been found at Clevedon, in Somersetshire, by the Rev. A. Norman.

It is perhaps to this genus that the *Gammarus nolens*, Johnston, Zool. Journ. iii. p. 179, may be referred ; it is about three or four lines long ; the antennæ have a whorl of short spines at each joint ; the arms and legs are monodactyle. It is found at Berwick amongst confervæ.

ANONYX ELEGANS.*—General colour yellowish-pink ; eyes red ; lateral plates adorned with scarlet stellate markings, of which there are five or six on those nearest the head, they

* Thompson, Ann. and Mag. Nat. Hist. xx. p. 243,

become gradually fewer on those towards the tail, so that not more than one appears on the hinder plates. Length six lines.

Bangor, Belfast Bay, in from five to six fathoms (Messrs. Hyndman and Thompson).

ANONYX EDWARDSII, Kroyer.* (Plate X. fig. 3.)—Lower antenna scarcely longer than the upper. Widely distributed. Moray Firth (Rev. Mr. Gordon); Banff (Mr. Edwards); Plymouth Sound (Mr. Bate); Falmouth (Mr. Webster).

ANONYX MINUTUS, Kroyer.—Lower antenna nearly three times as long as the upper; the scale-like coxæ of the two hinder legs produced, so as to cover the two next joints.

Plymouth Sound (Mr. Spence Bate).

ANONYX HOLBOLLI, Kroyer.—The scale-like development of the hinder legs *not* produced so as to cover the two next succeeding joints.

Moray Firth (Rev. Mr. Gordon); Plymouth Sound (Mr. Bate).

ANONYX AMPULLA, Kroyer.—Lower antenna five times as long as upper.

Moray Firth (Rev. Mr. Gordon); Banff (Mr. Edwards).

* This and the four next species are briefly described by Mr. Spence Bate; Ann. and Mag. Feb. 1857.

ANONYX DENTICULATUS, Spence Bate.—Posterior and lower end of the ninth and tenth segments from the head produced into a tooth-like process.

Moray Firth (Rev. Mr. Gordon) ; Banff (Mr. Edwards).

Gen. 68. TETROMATUS, *Spence Bate*.

Head projecting forwards into a snout ; eyes four, not compound ; upper antenna in advance of the lower, proceeding from the end ; lower situated far behind. Mandible with palpus ; jaw-feet imperfectly prehensile.

TETROMATUS TYPICUS, Spence Bate. (Plate X. fig. 4).—Head and front segments much compressed ; upper antenna half as long as the lower, the latter the length of the animal ; hind margin of the tenth segment from the head not ornate.

Moray Firth (Rev. Mr. Gordon) ; Plymouth (Messrs. Smyth and Bate).

TETROMATUS BELLIANUS, Spence Bate.—Upper antenna not so long as the peduncle of the lower ; hind margin of the tenth segment from the head ornate.

Moray Firth (Rev. Mr. Gordon) ; Plymouth Sound (Mr. Spence Bate).

Gen. 69. WESTWOODIA, *Spence Bate*.

Shell of the head developed in front beyond the head, so as to look like a hood, and produced into a point; upper antennæ situated before the lower, not appendiculated. Telson entire.

Named in compliment to J. O. Westwood, Esq.; a genus of Hymenopterous insects also bears the name of this most distinguished entomologist.

WESTWOODIA CÆCULA, *Spence Bate*. (Plate X. fig. 5.)
—Eyes converging into a single organ, situated above and in advance of the upper antenna. First jaw-foot subprehensile; second, simple, fringed on the fore margin of the propodus with a brush of hair.

Moray Firth (Rev. Mr. Gordon); Plymouth (Mr. Spence Bate).

Gen. 70. KROYERA, *Spence Bate*.

Head as in last; hands of jaw-feet well developed and formed by the carpus being produced so as to meet the apex of the dactylus.

Named after Kroyer, the able Danish Naturalist, who has specially studied the Amphipodous Crustacea.

KROYERA CARINATA, Spence Bate.—The joints from the sixth to the tenth from the head strongly keeled.

Banff (Mr. Edwards).

Gen. 71. PHOXUS, *Kroyer*.

Head produced into a beak; upper antennæ with two terminal filaments; mandible with a palpus; jaw-feet subcheliform; last pair of legs very small.

PHOXUS KROYERII, Spence Bate.—Upper antennæ reaching scarcely beyond the end of the beak; lower antennæ much longer.

Plymouth (Mr. Bate).

PHOXUS HOLBOLLI, Spence Bate.—The peduncle of the upper antenna reaching quite to the end of the beak; the lower scarcely longer than the upper.

Plymouth (Mr. Bate).

PHOXUS PLUMOSUS, Holboll.—Upper antennæ reaching beyond the lower; the penultimate segment of the peduncle of the lower produced below into a scale-like process; hair on the animal plumose.

Plymouth (Mr. Bate).

Gen. 72. SULCATOR,* *Spence Bate*.

Upper antennæ half as long as the lower, forked with two filaments. Lower antennæ with the second joint flattened. Second and third pairs of legs two-clawed. Telson double.

So called by Mr. Bate, from the furrow which the species make in the wet sand when crawling.

SULCATOR AREXARIUS. *Sand-ploughing Screw*.—Anterior coxæ largely developed. Basis of three hind legs developed in the form of scales, claws of these legs obsolete. Colour of a pale muddy grey.

Falmouth (Dr. Leach) ; Oxwich and Rhosilly Bay, near Swansea (Spence Bate) ; Moray Firth (Rev. Mr. Gordon).

Mr. Bates says of this species, that, “unlike the *Talitri*, *Gammarus*, and other allied genera, it is remarkably sluggish in its habits, and lives almost wholly beneath the sand, into which it burrows, and from which it appears only to come out just after the receding of the tide, when it gropes to the distance of about a foot, and again burrows beneath its surface. The legs, which by their formation are all lessened

* Spence Bate, Ann. and Mag. Nat. Hist., 1851, p. 318. Originally described under the name of *Bellia*, a name preoccupied by Milne-Edwards in Crustacea.

in their capability as members of perambulation, obtain, through the great expanse of surface which each joint displays, a paddle-like power, by which they are enabled to progress through the sand without resorting to leaps and bounds, the usual mode of passage among the *Talitri*, or by crawling whilst lying upon the side, after the manner of *Gammarus* and other *Amphipoda*.

SULCATOR MARINUS, Spence Bate.—Basis of three hind legs not developed in the form of scales.

Banff (Mr. Edwards) ; Macduff (Mr. Gregor).

Mr. Spence Bate, in writing on the habits of *Sulcator arenarius*,* remarks that naturalists suppose the respiratory process to be carried on in *Amphipoda* “by a current excited through the agency of the natatory feet, passing continually over the branchiæ situated beneath the thorax ; but the peculiar habits of this animal, living as it does chiefly beneath the sand, must materially interfere with the passage of such a current. Then may we not presume that the great extent of dermal surface, which is prolonged by large hair-like processes, may offer a medium through which the blood may be aerated, and so lessen the dependence of vital action upon the waters circulating freely over the branchial

* Ann. and Mag., 2nd series, vol. vii. p. 319.

organ? This seems to be supported by the fact, that blood-discs pass into the hair-like processes on the surface of the flabella in the *Brachyura*.”

Gen. 73. DARWINIA, *Spence Bate*.

First seven joints after head inflated; upper antenna not before the lower, without secondary appendage. All the feet terminating in simple hooks, not subcheliform.

Named in compliment to Charles Darwin, Esq., author of ‘Researches in Natural History, made during the voyage of the Beagle,’ of two volumes on the *Cirripedes*, and many other celebrated works.

DARWINIA COMPRESSA, *Spence Bate*.—Head produced into a beak; eleventh, twelfth, and thirteenth segments slender and weak, lying compressed beneath the body. Upper antenna stouter and longer than lower. Telson single, lanceolate.

Banff (Mr. Edwards); Macduff (Mr. Gregor).

Gen. 74. IPHIMEDIA, *Rathke*.*

Not compressed; upper antenna without secondary ap-

* Genus added to our Fauna by Mr. Spence Bate, Ann. and Mag. Nat. Hist. 1857.

pendage. Telson simple. First jaw-foot simple ; second subcheliform.

IPHIMEDIA OBESA, Rathke. (Plate X. fig. 6.)—Head produced into a beak ; upper antenna as long as the lower ; the dorsal ridge of the segments, from the seventh to the tenth, with two parallel spines.

Tenby (Mr. Webster) ; Macduff (Mr. Gregor) ; Plymouth (Mr. Spence Bate).

Gen. 75. ACANTHONOTUS, *Owen*.

First jaw-foot subcheliform. Telson divided ; mandible palpigerous.

ACANTHONOTUS TESTUDO.—Head armed with a beak ; the eighth to the eleventh segments produced behind into a strong spine ; the hind margins also denticulated on the sides ; anterior coxæ produced each to a point, the fifth directed posteriorly.

Banff (Mr. Edwards) ; Macduff (Mr. Gregor).

Gen. 76. DEXAMINE, *Leach*.

Four front legs nearly equal, with one finger, armed with a compressed, filiform, subovate hand. Antennæ with the

first joint shorter than the second. Eyes oblong, not prominent, inserted behind the upper antennæ. Tail on each side with three double styles, and furnished above on each side with a movable style.

DEXAMINE SPINOSA. *Spined Sea Screw*. (Plate X. fig. 7.)—When alive of a deep red-brown, and highly glossy; the four hind plates of the abdomen are keeled, and produced into a spine; head with a short beak; upper antenna with the second joint longer than the first.

Coast of Devon, and elsewhere, dragged on shore amongst marine plants and zoophytes.

To the genus *Dexamine* belongs the *Cancer carino-spinosus*, Turton, which Mr. Spence Bate has more fully described under the name *Gammarus Moggridgei* (Ann. and Mag. Nat. Hist. N. S. vol. vii. p. 318, t. 10, fig. 10).

The Rev. A. Norman has found it at Clevedon, Somerset.

DEXAMINE BISPINOSA, Spence Bate.—Second segment of upper antennæ not so long as the first; eighth and ninth segments only produced into a spine.

Plymouth (Mr. Spence Bate); Penzance, Falmouth, Moray, and Macduff.

DEXAMINE GORDONIANA.—Eleventh segment furnished with a spine.

Moray (Rev. Mr. Gordon).

DEXAMINE FUCICOLA, Leach, sp.—Of a testaceous ash-colour, varied with red ; with no dorsal spine.

Found by Dr. Leach among *Fuci* on the coast of Devon ; at Falmouth by Mr. Webster, and at Youghal by Mr. Ball.

Gen. 77. CALLIOPE, *Leach, Spence Bate.*

Upper antenna without secondary appendage. All the feet with strong semi-prehensile claws. Telson single. Mandible palpigerous.

CALLIOPE LEACHII, Spence Bate.—Antennæ subequal ; first and second jaw-feet subcheliform, subequal.

Devon (Dr. Leach) ; Moray (Rev. Mr. Gordon).

Gen. 78. ISÆA, *Milne-Edwards.*

Upper antenna with secondary appendage. All the feet prehensile. Telson reduced.

ISÆA MONTAGUI, M. Edw.—Upper antenna rather longer than the lower. First jaw-foot smaller than the second.

Plymouth (Mr. Spence Bate).

Gen. 79. LEMBOS, *Spence Bate*.

Upper antenna with secondary appendage small; first jaw-foot larger than the second; third leg very short; fifth very long. Telson rudimentary.

LEMBOS CAMBRIENSIS, *Spence Bate*.—First hand without a thumb.

Glamorganshire (*Mr. Spence Bate*).

LEMBOS VERSICULATUS, *Spence Bate*.—First hand without a thumb; second scarcely prehensile, the fourth and fifth joints furnished with a strong brush.

Plymouth (*Mr. Spence Bate*).

Mr. Bate has described two other species from the South of England—*L. Websterii* and *L. Danmoniensis*—both furnished with a thumb on the first hand.

Gen. 80. LONCHOMERUS, *Spence Bate*.

Like *Lembos*. Fourth joint of first jaw-foot produced into a long spine; hence the name, from *λογχος* and *μερος*.

LONCHOMERUS GRACILIS, *Spence Bate*.—Spine of fourth joint of first jaw-foot as long as the fifth joint; the fifth joint longer than the sixth; the terminal claw ornate.

Polperro (Mr. Loughrin); Glamorgan; Plymouth (Mr. Bate).

Gen. 81. EURYSTHEUS, *Spence Bate*.

First jaw-foot smaller than the second. Upper antenna with secondary appendage. Telson cylindrical.

EURYSTHEUS TRIDENTATUS, *Spence Bate*.—Palm of second jaw-foot convex, furnished with three obtuse teeth.

Plymouth (Mr. Bate); Macduff (Mr. Gregor).

Gen. 82. GAMMARELLA, *Spence Bate*.

Antennæ like *Gammarus*, and upper with secondary appendage. Last pair of false legs with a single branch. Telson single.

GAMMARELLA ORCHESTIFORMIS, *Spence Bate*.—Upper antenna longer than the lower; hand of first jaw-foot small, hand of second very large and oval; caudal appendages short.

Polperro (Mr. Loughrin).

Gen. 83. AMATHIA, *Rathke*.

Upper antenna with secondary appendage ; telson entire ; animal shaped like *Gammarus*.

AMATHIA CARINATA, Rathke. Head with a small beak ; centre of the dorsal surface surmounted by a distinct keel, commencing at the head and terminating with the caudal segments.

This species, described by Rathke as a native of the shores of the Crimea, has been recently sent to Mr. Spence Bate from Banff by Mr. Edwards.

Gen. 84. GAMMARUS, *Latr.*

Upper antennæ slender, and furnished at the base of the fourth joint with a small jointed bristle. Tail above furnished with tufts of spines.

First and second pairs of legs subcheliform, the others not prehensile ; six hind pairs of legs similar to each other. Telson double.

GAMMARUS LOCUSTA. *Common Coast Screw*.—Of a horny colour ; body smooth, glossy, compressed ; eyes lunated. Length an inch.

Common on all the coasts of Britain. Colonel Montagu observes that this species is wholly marine, never quits the water by choice, is incapable of leaping, and seems to have very little use of its legs out of that element; for when deprived of water it lies on its side, and endeavours to force itself along by the action of its tail. If put into fresh water, it soon dies.

GAMMARUS CARINATUS.*—Body clouded with red and horn-colour, and sometimes with white, and sprinkled with minute yellow dots. Segments of the back strongly keeled, hind margins with distant granules.

Berwick, often taken in baskets used for catching crabs.

GAMMARUS MARINUS. *Leach's Coast Screw*.—The process between the antennæ somewhat pointed.

Hab. South coast of Devon. Strangford Lough (Thompson); Ballysodare, Sligo (Mrs. Hancock).

GAMMARUS CAMPTOLOPS. *Bent-eyed Coast Screw*.—Eyes flexuous, shaped somewhat like the letter S. Found in the sea near Loch Ranza in the Isle of Arran (Dr. Leach); River Lagan, Belfast (Messrs. Hyndman and Thompson).

GAMMARUS MACULATUS. *Spotted Coast Screw*.—Body smooth, glossy; back dusky, with a faint yellow band

* Dr. Johnston, Zool. Journ. iv. 52.

across each segment, and a row of yellow spots along each side. Eyes oblong, red, running backwards.

Sea-coast near Berwick ; rare.

GAMMARUS FLUVIATILIS. *Fresh-water Screw*.—Eyes ovate ; three last joints of body smooth ; lower pair of caudal fins rather the longest ; legs rough.

Found in fresh-water ; cannot leap, and dies very soon when taken out of water.

GAMMARUS GRACILIS, Rathke.—Upper antenna much longer than the lower. Last pair of hind false feet with the stylets unequal.

Plymouth (Mr. Bate).

GAMMARUS PALMATUS, Montagu.—First jaw-foot with a very small hand ; second, with hand very large and square ; last joint scimitar-shaped.

Devonshire (Montagu) ; Plymouth (Mr. Spence Bate).

GAMMARUS OTHONIS, Edwards.—Hands subequal, long and narrow towards the extremity. The last of the false feet with the stylets equal.

Plymouth (Mr. Spence Bate).

GAMMARUS LONGIMANUS, Leach.—Second hand much larger than the first, very long, and not narrowing towards the extremity ; last caudal stylets equal.

South coast of England (Dr. Leach); Plymouth (Mr. Spence Bate); Belfast (Mr. Thompson).

GAMMARUS BREVICAUDATUS, Edwards.—Lower antenna not reaching to the end of the peduncle of the upper. Last pair of caudal stylets extremely short.

Plymouth (Mr. Spence Bate).

GAMMARUS GROSSIMANUS, Montagu.—When alive, pale-yellow, sometimes mottled with pink. Hands of second pair of jaw-feet large, ovate, compressed; the fangs long and hooked, folding on the edge of the hand. Length five lines.

Rocky shores; common in pools left by the receding tide. Devonshire and Berwick, Plymouth.

GAMMARUS INÆQUIMANUS, Spence Bate.—Second pair of jaw-feet with the left hand four times as large as the right. A dorsal spine on the eleventh segment after the head, and two smaller placed laterally on the next.

Polperro (Mr. Loughrin).

GAMMARUS? PALLIDUS, Spence Bate.—Upper antenna shorter than the lower. Hands large, with last joint well developed and fringed internally with teeth.

Plymouth (Mr. Spence Bate).

Gen. 85. UROTHOE, *Dana*.

Upper antennæ scarcely longer than the peduncle of the lower. Coxæ moderately developed. Jaw-feet prehensile; last joint of other feet styliform. Telson double.

UROTHOE ELEGANS, Spence Bate.—Hands of jaw-feet very small. Upper antennæ shorter than the lower. Last pair of caudal stylets feathery and subequal.

Plymouth (Mr. Spence Bate). Mr. Bate remarks that this scarcely differs from the species described by the American naturalist, which is a native of the Sooloo Sea.

Gen. 86. NIPHARGUS, *Schiædte*.*

Eyes wanting; upper antennæ longer than the lower: the accessory flagellum minute, two-jointed; last pair of legs with the inner style very short, the outer much lengthened and two-jointed.

The type of this genus is a native of the subterranean grottos of Adelsberg in Carniola, where it occurs in little pools in the hollows formed by the dripping; it springs

* Stockholm Transactions, 1851. Halliday in 'Natural History Review,' Jan. 1857, p. 41.

very nimbly, and is difficult to catch, making for the bottom immediately on being disturbed. Besides the *Proteus anguinus*, these caves have several peculiar insects and *Aptera*. Dr. Schiødte has described, in the work cited, as a new species the *Niphargus*, which Mr. Westwood exhibited at the Linnean Society (Proc. Linn. Soc. April, 1853) as *N. stygius*.

NIPHARGUS AQUILEX, Schiødte. *The Well Screw*.—Snow-white; the epimera are all shorter than their corresponding segments in depth; eighth, ninth, and tenth segments nearly equal in depth. From three to four lines in length.

Found in great numbers in a well near Maidenhead, the water of which was, in consequence, rendered unfit for use. May not this be the *Gammarus subterraneus* alluded to by Leach in the seventh volume of the 'Edinburgh Encyclopædia'?

Gen. 87. BATHYPOREIA, *Lindstr.**

Upper antennæ with second joint of the peduncle pro-

* Mr. Spence Bate now refers his genus *Thersites* to this, and the species *T. Guilliansoniana* to *Bathyporeia pilosa*.

duced from the lower side of the first. Second jaw-foot ending in a brush. Telson double.

BATHYPOREIA PILOSA, Lindstr.—Lower antennæ as long again as the upper. Mr. Spence Bate records this as having been found at Weymouth by Professor Williamson.

BATHYPOREIA PELAGICA, Spence Bate.—Lower antennæ six times as long as the upper.

Sent to Mr. Bate by the Rev. Mr. Gordon from the Moray Firth.

Gen. 88. LEUCOTHOE, *Leach*.

First pair of jaw-feet with two toes, thumb two-jointed, basal joint subovate; second pair with a dilated compressed hand, furnished with a bent thumb. Five hind pairs of legs slender. Telson single.

LEUCOTHOE ARTICULOSA, Montagu. *Jointed Coast Screw*.—Body elongated and laterally compressed. Antennæ of three joints; head with a short down-curved beak. Telson long and lanceolate.

Rare on the south coast of England. Mr. Spence Bate finds it at Plymouth, and the Rev. Mr. Gordon has sent it from the Moray Firth.

LEUCOTHOE FURINA, Savigny.*—Hand of the first jaw-feet short, of the second long, and narrower than in the last; palm denticulated.

Banff (Mr. Edwards).

FAM. COROPHIDÆ.

Adapted for crawling. Body more or less depressed, linear; abdomen straight; eighth and following segments not fused together; epimera very narrow, mandibles bearing a palpus. Antennæ like a leg.

The following genera are placed in the subdivision named *Domicola* by Mr. Bate. The different species “live in abodes of their own construction; some burrow in wood, some in clay; some erect tubes of mud, or stones and weed, and others build nests with materials united by a substance secreted by the animal” (Spence Bate).

Gen. 89. CERAPUS, Say.

Animal inhabiting a case; the antennæ without flagellum; two of the toes with two joints.

* Mr. Spence Bate at first regarded this as a new species, which he named *L. procerà*.

Some, if not the majority, of the species of the group named *Podoceridæ* by Leach, inhabit a tube considerably resembling that of the Caddis-worms (*Phryganeidæ*). Mr. Say has described* one of these, a native of the sea-coast of the United States. The *Cerapus tubularis*, as he calls it, is about a quarter of an inch long, and is found amongst seaweeds on the beach of Egg-harbour. It is a very active little animal, running with great ease amongst the algæ and corallines, notwithstanding the encumbrance of its cylindrical tube. The true feet are included in the tube, excepting the two front pairs, with which it seizes its prey and conveys the captures to its mouth. The four elongated antennæ, which are more than half the length of the creature, are employed as walking feet. When the *Cerapus* swims about, the half of the body is projected from the tube, and is suddenly and often bent, so that it advances by a series of jerks. The tube, Say thinks, is not constructed by the *Cerapus*, who chooses, much after the fashion of the Hermit Crab, the residence, abandoned or tenanted, of a *Tubularia*, one of the Annelids very common on the coast. This abode is always in proportion to the size of the animal; although

* Journ. Acad. Nat. Sciences, of Philadelphia, vol. i. pp. 49-52, pl. iv. fig. 6, 7-11.

it seems to invest it closely, the *Cerapus*, whenever anything is in the way which prevents it proceeding, can turn its body without difficulty, and the head may very soon be seen protruding from the opposite end of the tube, so that either extremity may be used as the front part. Say believes that the chief food of the *Cerapus* consists of the animal of a *Sertularia*, but there is little doubt that, like the *Corophium*, it feeds on various small marine worms, as well as on other small sea animals.

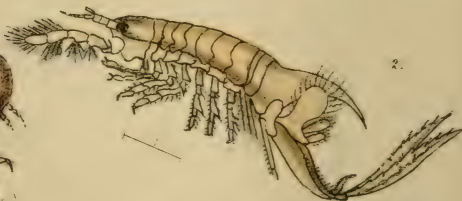
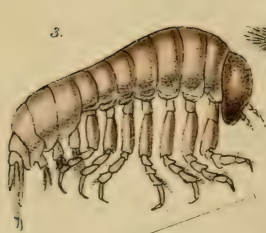
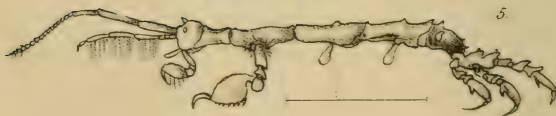
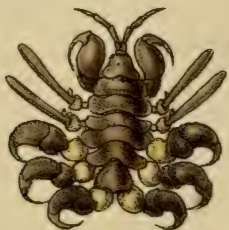
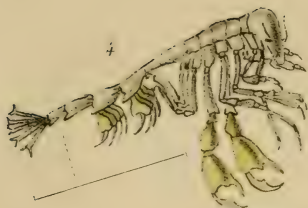
Kroyer has met with the *Podocerus Leachii* in the Baltic; it lives in a membranaceous tube.*

CERAPUS WHITEI, Gosse.—This seems to be very partial to the submerged tufts of the *Chondrus crispus*, that alga which when dry is sold as “Carrageen Moss.” Mr. Gosse, who described it in his ‘Naturalist’s Rambles on the Devonshire Coast,’ p. 382, remarks as follows:—“It must be sought at extreme low-water, about the sides of rocks that are laid bare only at the spring-tides of March and September, and the alga itself will be masked under a crowd of *Laomedea*, *Sertularia*, *Anguinaria*, *Pedicellina*, and other parasitic zoophytes, and half covered with a thick coat of dirty floccose matter, the ejecta, as I suppose, of these

* Nat. Tidssk. iv. 164.

creatures. Among these, and assisting to conceal and metamorphose the plant, you may find a number of conical tubes, varying from one-sixteenth to one-eighth of an inch in length, made of a somewhat tough papery or leathery substance, of a dusky colour, and of a rough surface. They are stuck upon the fronds of the seaweed in all directions, without any order, some laid along, others standing erect; sometimes singly, sometimes associated. From the open extremity project two pairs of stout jointed antennæ, both of which are armed on their under edge with double rows of spreading spines, like those of the interior antennæ in *Capprella*. These well-armed organs are affixed to a large oval head, just in front of two black eyes, and are thrown about incessantly, forcibly clutching at the water, or rather at whatever may be passing in the water. The head ordinarily just projects from the mouth of the tube sufficiently to see what is going on without, and what prospect there is of a successful throw; but sometimes the creature protrudes his first two pairs of feet. . . . The animal in its tube much resembles the larva of the genus *Phryganea*, that anglers value under the name of Caddis-worms. There, however, the case is composed of minute pebbles, bits of shell, etc., imbedded in a glutinous silk, with which the interior is





Sowerby del. et lith.

Vincent Brooks Imp

1. *Orchestoidea longicauda* 2. *Chelura terebrans* 3. *Hypena Latreillei* 4. *Phormidium*
sedentaria 5. *Caprella tuberculata* 6. *Gyamus Ceti*

smoothly lined. In our little Crustacean, I do not know of what it is made, or how, but it seems to be homogeneous, and is certainly of home manufacture, and not the tube of a zoophyte surreptitiously obtained, as has been supposed to be the case with the *Cerapus tubularis* of North America. Perhaps, however, closer examination might refute the charge of piracy brought against that species."

Gen. 90. COROPHIUM.

Lower antennæ much longer than the upper and without flagellum, only the first pair of legs furnished with a flagellum. Hand of second pair of legs not dilated. Body nearly cylindrical, elongated, slightly compressed.

COROPHIUM LONGICORNE. (Plate XI. fig. 1.)—Male much larger than the female; third joint of lower antennæ much thicker than the fourth, and having in front a thick pointed apophysis. Legs with long hairs, most abundant on the second and seventh pairs.

Coast of England. Berwick. Common in the autumn, in pools of brackish water left at the sides of the river on the recess of the tide (Dr. Johnston); Moray Firth (Rev. G.

Gordon). Dr. Johnston* remarks that, "in summer it crawls about the muddy shores; but in autumn and winter it lurks in cylindrical holes which it makes in the clay near high-water mark. These holes exactly resemble those that are made by a worm; they are about two inches in depth, perpendicular to the surface, and nearly parallel to each other. As great numbers are bored close together, the clay appears as thoroughly drilled as does a piece of wood that has been eaten with the maggot of the wood-beetles."

The habits of the *Corophium longicorne* have been studied by M. D'Orbigny, of Rochelle,† who observed them in the Bay of L'Aiguillon, near that place, where they are called Pernys. During the winter he believes that they retire to the deep sea, as they do not begin to appear till the month of May, when they are found living in holes in the mud, and disappear at the end of September. The roughness of the waves causes the sand and shingle of shallow parts of the bay to collect in elevated ridges; the depressions between these and the ridges are tenanted by various Annelids of the genera *Nereis*, *Amphinome*, *Arenicola*, etc., which, when the sea comes up, show themselves at the holes of their

* History of Berwickshire Naturalists' Club, 1842-1849, p. 78.

† Letter to Latreille, Enc. Meth. x. 164, 165 (*Podocere*).

retreat, and seize the marine animalcules on which they feed. The *Corophium*, which runs very quick, wages war on these Annelids, and pursues them relentlessly. Numbers of them may be seen attacking sea-worms ten or twenty times their size, and even small fish and mollusca that come in their way are eaten by them. Millions of them may sometimes be seen beating the mud with their large antennæ, in pursuit of their food. In their turn, they become the prey of many birds and fishes.

Although Mr. Bate does not appear to have met with any species of Say's genus *Unciola*, we may mention that Mr. Gosse found the *Unciola irrorata* of the American naturalist in our seas.*

Gen. 91. CYRTOPHIUM, *Dana*.

The first to the seventh joints after the head, inflated; the following joints compressed. The last false feet rudimentary. Telson scale-like.

CYRTOPHIUM DARWINII, Spence Bate.—Dorsal surface imbricated; the fourth false foot longer than the fifth.

* Mr. Gosse has figured this species in the first part of his excellent *Manual of the Marine Zoology of the British Isles*, p. 141 (fig. 256, on p. 139).

Falmouth (Mr. Webster).

Gen. 92. ERICHTHONIUS, *Milne-Edwards*.

Lower antenna not pediform. Thumb developed on the carpus of the second jaw-foot. Posterior false feet single branched, ending in hooks. Telson furnished with curved spines.

ERICHTHONIUS DIFFORMIS.—Thumb on the second jaw-foot two-pointed.

Found at Swansea and Plymouth by Mr. Spence Bate.

Gen. 93. SIPHONÆCETUS, *Kroyer*.*

Lower antennæ subpediform, longer than the upper. First and second jaw-feet prehensile. Posterior false feet single branched, terminating in hooks. Telson furnished with teeth or hooks. The five pairs of legs ending in curved spines.

SIPHONÆCETUS KROYERANUS, Spence Bate.—Upper antenna short; terminal joint of front legs styliform and without a curve.

* So named by the Danish naturalist from the animal living in a siphon, or tube, which it constructs of different materials.

Weymouth (Professor Williamson).

SIPHONÆCETUS CRASSICORNIS.—Basal joint of upper antenna having the anterior superior margin developed into a horn reaching to the end of the second joint.

Sent to Mr. Bate from the coast of Northumberland, where it was found by Mr. Alder.

Gen. 94. PODOCERUS, *Leach*.

First and second pairs of legs subcheliform; the lower antennæ without flagellum, and like a leg; the eyes placed on a projecting lobe of the head; second pair of legs much larger than the first pair, and their hand better adapted for holding.

A genus of small species which live among seaweeds, and seem to feed principally on zoophytes.

PODOCERUS VARIEGATUS, *Leach*.—Whitish, varied with reddish; first pair of legs small; the hand slender and elongated. Hands of second pair somewhat oval. A tooth on the middle of the hind margin of last thoracic and first abdominal ring.

Found on various parts of our coast, as on the Bell Rock (Mr. Stevenson); Plymouth (Mr. Spence Bate).

PODOCERUS PULCHELLUS.—Eye-bearing lobes prominent; rings of the back without teeth. Hands of second pair of legs very large, and armed beneath with two rounded teeth. White, varied with reddish.

South coast of England, and Berwick (Dr. Johnston); Swansea (Mr. Spence Bate); Banff (Mr. Edwards).

Gen. 95. JASSA, *Leach*.

Eyes not prominent. The four front legs with ovate hands; the second pair larger, the inner edge armed with spines.

Mr. Spence Bate believes that this genus is founded merely on females of the preceding.

JASSA PELAGICA, *Leach*. *Bell Rock Screw*. (Plate X. fig. S.)—Body ash-coloured, varied with brown; the hand of second pair with its inner edge notched in a lunar form.

Found on the Bell Rock by Mr. Stevenson, the engineer, when superintending the erection of the lighthouse.

JASSA FALCATA, *Montagu*. *Montagu's Rock Screw*.—Body crimson or mottled, with a mixture of white. Hands of second pair of legs with two spines on the inner edge. Length five lines.

Hab. Torcross, Devon, amongst *Sertulariæ* and *Algæ*.

This is perhaps only the other sex of the preceding. Mr. Thompson found them together in Strangford Lough.

It is perhaps to this genus that the *Gammarus spinipes* of Dr. Johnston is referable (Zool. Journal, iv. p. 417). The body is white, with transverse red lines; hand of second pair of legs dilated, tip triangular, one-toed, furnished on the under side with a strong spine. Found by Dr. Johnston among *Sertulariæ* taken from a fishing-boat, so that it probably inhabits deep water.

Gen. 96. PLEONEXES, *Spence Bate*.

Upper antennæ without secondary appendage. Peduncle of the lower antennæ reaching nearly to the end of the upper antennæ. Jaw-feet subcheliform. Posterior true legs prehensile.

PLEONEXES GAMMAROIDES, *Spence Bate*.—Lower antennæ not pediiform. Second jaw-foot with hand nearly square and larger than the first.

Penzance (Mr. Barlee).

Gen. 97. AMPHITHOE, *Leach*.

Upper antennæ the longest, without a bristle at the base of the fourth joint. Tail above without bundles of spines. Hands ovate or filiform. First and second pairs of legs subcheliform.

Mr. Bate remarks that the species of this genus "build nests made of weed and material of their own secretion."

AMPHITHOE RUBRICATA. *Montagu's Coast Screw*.—Body slender, usually reddish, or pale pink, minutely and closely speckled with darker spots of the same hue. Hands ovate, without notch.

South coast of Devon (Montagu); Strangford Lough (Hyndman and Thompson); Springvale, Down (Thompson).

AMPHITHOE LITTORINA.* *Johnston's Coast Screw*.—Body smooth, olive-green, speckled with minute black dots; back of segments deeply punctured; a deep semilunar fissure between wrist and hand.

Near Berwick, amongst *Confervæ*, in pools left by the tide; also Springvale, Down, Ireland. It lives, says Dr. Johnston, in a furrow from one to two inches long, com-

* *Gammarus punctatus*, Johnston, Zool. Journ. iii. pp. 197 and 490; the specific name preoccupied by Say, so it has been altered by Mr. Bate.

posed of pieces of seaweed, and lined internally with a thin, smooth, and glutinous membrane. This furrow is attached to the under side of stones, or is imbedded in some entangled seaweed. A male and female reside in each. Dr. Johnston adds that he has seen them, when expelled from it, repeatedly return and re-enter it.

AMPHITHOE OBTUSATA. *Leach's Coast Screw*.—Of a pale brown, usually mottled with rufous brown, especially about the legs; arms four, the front pair very small, the others furnished with large hands, the claw a little hooked, always blunt at the end. Length three-eighths of an inch.

Salcomb Bay.

AMPHITHOE DUBIA.—Horny colour, with a few red lines on back. Hands equal, oblong, not much dilated, and sparingly ciliated.

Near Berwick, amongst *Confervæ*, in pools left by the tide (Dr. Johnston).

Gen. 98. SYNAMPHITHOE, *Spence Bate*.

Second jaw-foot larger than the first; posterior false feet with one branch squamiform, the other ending in two hooks. Telson terminating in a single strong hook.

SYNAMPHITHOE HAMULUS, Spence Bate.—Antennæ subequal; posterior true legs scarcely prehensile.

Moray Firth (Rev. G. Gordon); Penzance (Mr. Harris).

SYNAMPHITHOE CONFORMATA, Spence Bate.—Upper antennæ longer than the lower; posterior true legs subprehensile.

Plymouth (Mr. Spence Bate).

FAM. CHELURIDÆ, *Allman*.

Body scarcely compressed. Abdomen abnormal; two or three segments united and irregular; six caudal styles, dissimilar; antennæ short, leg-like.

There is but one genus of this family, the species of which burrows into wood, and, along with the *Limnoria*, helps to destroy woodwork washed by the sea.

Gen. 99. CHELURA, *Philippi*.

The fourth, fifth, and sixth segments united into a styli-form joint. Upper antennæ shorter than the lower, furnished with a secondary appendage. Lower antennæ with segments of filament fused.

CHELURA TEREBRANS, *Philippi*. (Plate XI. fig. 2.)—Jaw-

feet imperfectly cheliform; tenth segment from the head produced into a large spine posteriorly.

This species was known to Dr. Leach, as there are specimens from the English coast in his collection in the British Museum. According to Professor Allman, Messrs. Mullins and Ball first found it in Ireland, in excavations formed in the timber piles of the jetty in Kingstown Harbour, near Dublin.

Major Martin found it at Ardrossan, and Mr. Spence Bate at Plymouth.

On its habits, Professor Allman* observes as follows:—
“*Chelura terebrans* is an active little animal, swimming on its back, and employing its thoracic legs to adhere to the timber which it has selected for its ravages. The large lamellar appendages, placed near the anterior end of the great abdominal trunk, do not appear to be employed in swimming, they are kept thrown upwards on each side of the spinous process of the third abdominal segment, and seem in no way subservient to locomotion; they are not confined to any particular sex, and it is difficult to assign to them any office, unless it be that of keeping the excavations formed by the amphipod free from the detritus of the

* Ann. and Mag. Nat. Hist. vol. xix. pp. 367, 368.

timber, and from other extraneous bodies which might interfere with respiration. When removed from the water and placed upon a resisting surface, the little Crustacean bends the abdomen under the thorax, brings the terminal appendages between the antennæ, and then suddenly resuming its straight condition, springs to a considerable distance. The habits of *Chelura terebrans* are truly xylophagous, and it excavates the timber not merely for the purpose of concealment, but with the object of employing it as food, which is apparent from the fact that the alimentary canal may be found on dissection filled with minutely comminuted ligneous matter. It will freely attack a piece of timber placed with it in a glass of sea-water, so that its habits may be studied in confinement. Timber which has been subjected to the ravages of *Chelura* presents a somewhat different appearance from that which has been attacked by *Limnoria terebrans*. In the latter, we find narrow cylindrical burrows running deep into the interior, while the excavations of *Chelura* are considerably larger, and more oblique in their direction, so that the surface of the timber, thus undermined by these destructive animals, is rapidly washed away by the action of the sea, and the excavations are exposed in the greater part of their extent, the wood appear-

ing ploughed up, so to speak, rather than burrowed into. Upon the whole, *Chelura* would seem to be a still more destructive creature than even *Limnoria*."

Tribe HYPERITA.

Head very large. Mandibles large, generally ending in crests rather than teeth. First pair of jaw, of three joints, the two last lamellar, the thorax of six or seven joints; some of the legs prehensile and of curious form; end of abdomen adapted for swimming but not for leaping.

The species of this tribe are more or less parasitic, some of them being attached to Fishes, and others to Medusæ.

FAM. PHRONIMADÆ.

Second pair of antennæ styliform, and not capable of being folded on themselves. Body swollen, head very large; some of the true legs prehensile.

Gen. 100. HYPERIA.

Body wider than high, swollen above, blunt in front, swollen towards the middle, and considerably narrowed behind. Head very large, the eyes occupying its greater part.

First pair of antennæ simple, conical, very short. Two first pairs of legs not prehensile. Telson lanceolate.

HYPERIA LATREILLII, Milne-Edwards. (Plate XI. fig. 3.)
—Of a brownish colour, about eight lines long; the lower antennæ as long as the upper, and of the same form; the first six or seven joints of the filament of upper and lower antennæ fused; five last pairs of legs nearly all of the same size; terminal abdominal plate triangular, blunt at the end.

Found on the south coast of England, and obtained by Mr. Ball in great numbers in the cavities of a *Rhizostoma*, at Youghal. To this genus also belongs the *C. Gammarus Galba* of Montagu, found on the south coast of Devon, and met with by Mr. Hyndman, on the Dublin coast, in the pouches of *Rhizostoma Cuvieri*. Mr. Spence Bate regards this as synonymous with Montagu's species.

HYPERIA OBLIVIA, M. Edwards.—Lower antenna longer than the upper, and the segment of the filament of the upper antenna only fused; the legs long.

Moray Firth, Rev. Mr. Gordon, who sent it to Mr. Spence Bate.

Gen. 101. METOECUS, *Kroyer*.

Two first pairs of legs much shorter than the following, and ending in a little two-toed claw, the movable finger of which has at the end a little rudimentary nail.

METOECUS MEDUSARUM, O. Fabr., sp.—Five last pairs of legs very slender, the three last longer than the others.

Coast of Devonshire (Gosse).

This curious parasite lives in the cavities of various species of *Acalephæ*. Mr. Gosse met with it in those of the Red-lined *Chrysaora*; he thus alludes to it in his 'Naturalist's Rambles on the Devonshire Coast,' p. 367. "A little shrimp-like creature, about half an inch in length, with large, lustrous green eyes, makes these chambers his residence, dwelling in them as in so many spacious and commodious apartments, of which he takes possession, I am afraid, without asking leave of the landlord, or paying him even a peppercorn rent. There, however, he snugly ensconces himself, and feels so much at home, that he is not afraid to leave his dwelling now and then, to take a swim in the free water, returning to his chamber after his exercise." What Mr. Gosse believes to be the larvæ of this, are like minute white specks, "not larger than a grain of sand,

shaped somewhat like a toad, with the abdomen distinctly separated, narrow, and bent abruptly under, in the manner of the *Brachyura*."

Gen. 102. PHRONIMA.

Head large, vertical; two antennæ inserted, one on each side of the front; tail ending in styliform threads. Body very soft, half transparent. Legs all long, slender, and feeble; the fifth pair the longest, directed backwards, and ending in a strong, swollen, two-fingered claw.

PHRONIMA SEDENTARIA. *Fleming's Hermit Screw*. (Plate XI. fig. 4.)—Body nearly transparent; two first pairs of legs compressed and prolonged at the end.

Found by the Rev. Dr. Fleming at Burray, among the Shetland Isles.

This curious creature lives inside a cylindrical cocoon, open at both ends; the latter is of a gelatinous texture, and is probably formed of the body of some *Beroë*.

We have apparently in the British Islands more than one species of the family *Typhidæ*; they are not well made out. The antennæ in this family are inserted on the lower part of the head, and are folded three or four times on each other.

FAM. *DULICHIADÆ*, *Spence Bate*.

The seventh and thirteenth segments from the head absent. Coxæ of the last two true legs fused with the body of the animal.

Gen. 103. *DULICHIA*, *Kroyer*.*

The sixth and seventh pairs of legs attached to the sixth segment after the head; last pair of false feet absent. Telson single.

DULICHIA PORRECTA, *Spence Bate*.—Upper antennæ half as long as the body. Second gnathopod with a long, straight, spine-like thumb proceeding from the posterior extremity of the palm. Hands not armed in the female.

Sent to Mr. Bate, from Macduff, by Mr. Gregor.

DULICHIA FALCATA, *Spence Bate*.—Upper antennæ as long as the animal. Thumb at the extremity of the palm, crooked.

From the same locality as the preceding.

* Two species first described by Mr. Bate under the generic name *Dyopedos*; he subsequently ascertained that they belonged to Kroyer's genus.

ORDER II. *LÆMODIPODA*.

This Order is restricted to a small number of species, all of curious form, in which the abdominal portion of the body is in a very rudimentary state, being represented by a scarcely visible tubercle. Body cylindrical or depressed; head very small; the six thoracic rings very distinct; legs exposed at base; sometimes there are seven pairs, sometimes five, third and fourth pairs sometimes represented by tubercles from which spring lamellar or vesicular appendages. The female has the egg-pouch on the second and third rings. Mr. Spence Bate merges this Order in *Amphipoda*.

Mr. Gosse has given much information on the habits of the British species, in one of his works.* He is describing the genus *Caprella*. These Crustacea are found on the pinnated branches of the zoophyte, *Plumularia cristata*. "They are as much at home in the tree-like zoophyte as a family of monkeys in their arboreal bowers; and indeed their agility, as they run from branch to branch, catching hold of a twig just within reach, and pulling themselves in an instant up to it, then stretching out their long arms in

* Naturalist's Rambles on the Devonshire Coast, pp. 379-381.

every direction, strongly reminds me of the spider monkeys of South America. One needs little systematic knowledge to see that they are highly predatory. Strange, spectre-like creatures they are, or rather skeleton-like, with long, slender bodies, composed of few joints, and wide sprawling limbs set at remote distances—and such limbs! Two pairs of stout antennæ, bristled with stiff spines, project from the head; then the first and second pairs of legs, but especially the latter, have the last joint but one developed to a great size, while the terminal joint is so formed as to shut down upon it, just as the blade of a clasp-knife does upon the handle. Then, to add to the efficiency of this instrument of prehension, the great joint which represents the haft is armed with a double row of spines set at an angle, so as to make a groove, into which the blade falls, and this latter is cut along each side of its edge into fine teeth, like those of a file. I find several species, even on the same small fragment of weed if it be tolerably well peopled with *Plumulariæ* or *Pedicellinæ*, some much larger than others, and beautifully mottled with transparent ruby-colour on a clear horn; and there is a species larger still, of a dull purplish-red hue. But all have pretty much the same manners, except that the smaller species are more agile. These manners

are excessively amusing. The middle part of their long body is destitute of limbs, having, instead of legs, two pairs of oval clear vesicles; but the hinder extremity is furnished with three pairs of legs armed with spines and a terminal hooked blade like that already described. With these hindmost legs the animal takes a firm grasp of the twigs, and rears up into the free water its gaunt skeleton of a body, stretching wide its scythe-like arms, with which it keeps up a seesaw motion, swaying its whole body to and fro. Ever and anon, the blade is shut forcibly upon the grooved haft, and woe be to the unfortunate Infusory or Mite or Rotifer that comes within that grasp! The whole action, the posture, the figure of the animal, and the structure of the limb, are so like those of the tropical genus *Mantis* among insects, which I have watched thus taking its prey in the Southern United States and the West Indies, that I have no doubt passing animals are caught by the Crustacean also in this way, though I have not seen any actually secured. The antennæ too, at least the inferior pair, are certainly, I should think, accessory weapons of the animal's predatory warfare. They consist of four or five stout joints, each of which is armed on its inferior edge with two rows of long, stiff, curved spines, set as regularly as the teeth of a comb, the

rows divaricating at a rather wide angle. From the sudden clutchings of these organs I have no doubt that they too are seizing prey; and very effective implements they must be, for the joints bend down towards each other, and the long rows of spines interlacing must form a secure prison, like a wire-cage, out of which the jaws probably take the victim, when the bending in of the antennæ has delivered it to the mouth. But these well-furnished animals are not satisfied with fishing merely at one station; they climb nimbly and eagerly to and fro, insinuating themselves among the branches, and dragging themselves hither and thither, by the twigs, on a straight surface. When marching (the motion is too free and rapid to call it *crawling*) along the stem of a zoophyte, the creature proceeds by leaps, catching hold with the fore limbs, and then bringing up the hinder ones close, the intermediate segments of the thin body forming an arch, exactly as the caterpillars of the geometric moths do. But the action of the Crustacean is much more energetic than that of the caterpillar. Indeed, all its motions strike one as peculiarly full of vigour and energy. I have seen the large red species swim, throwing its body into a double curve like the letter S, with the head bent down, and the hind limbs turned back, the body

being in an upright position. It was a most awkward attempt, and though there was much effort there was little effect."

FAM. *CAPRELLIDÆ*.

Body elongated, cylindrical, and very narrow. Four well-developed antennæ. Legs long and slender. Coxæ fused with the body of the animal.

Animals not parasitic.

Gen. 104. *CAPRELLA*, *Lam.*

Second and third thoracic rings without legs, but each furnished with a pair of branchial vesicles or lamellæ. Head swollen in front and narrowed behind. First pair of antennæ much longer than second pair, which latter are pediform.

Mr. Henry Goodsir* says they cast their skins often: before the process commences, the animal is so languid as to appear dead; a slight quivering motion then takes place, when the skin bursts transversely on the head and down the middle thoracic segments.

CAPRELLA LINEARIS. *Pennant's Skeleton Screw.*—Head

* Edin. New Phil. Journal, xxiii.

elongated, without teeth or tubercles; lower antennæ ciliated. First joint of thorax not swollen above the insertion of second pair of legs; the hands of second pair nearly oval, truncated in front and below; the male has three teeth, the female only one, on the lower margin. Half an inch long.

On the coast in various places. Devon; Firth of Forth; Berwick Bay, among corallines, in deep water.

CAPRELLA LÆVIS, Goodsir. *Smooth Skeleton Screw*.—Larger than the last, being an inch long. Head nearly triangular; swelling on the first joint of thorax, near the hind edge.

Firth of Forth (Goodsir).

CAPRELLA ACANTHIFERA, Leach. *Spined Skeleton Screw*.—Head oval, short, and rounded above. First joint of thorax swollen above insertion of first pair of legs; second pair of legs very hairy; their hand strongly notched beneath, and with a strong tooth below. Length, half an inch.

British coast.

CAPRELLA TUBERCULATA, Goodsir. *Goodsir's Skeleton Screw*. (Plate XI. fig. 5.)—Allied to the last, but may be distinguished by the double fringe of spines on the lower edge of the inferior antennæ: the upper antennæ are also much shorter than in preceding species.

Firth of Forth (Goodsir) ; Strangford Lough (Hyndman and Thompson).

CAPRELLA ACUTIFRONS. *Leach's Skeleton Screw*.—Head oval, surmounted by a point ; lower antennæ much ciliated ; first joint of thorax cylindrical, not thicker than the head.

British coast.

CAPRELLA PHASMA. *Montagu's Skeleton Screw*.—Head round, surmounted by a point ; first joint of thorax narrowed behind, armed with two strong spines one before the other.

South of Devon (Montagu) ; Isle of Man (Dr. Fleming).

Colonel Montagu, in the 'Linnean Transactions,'* records his observations on the *Caprella phasma*. He remarks that "the female differs in possessing several plates or valves beneath the body, situated between the two pairs of fins ; the office of these is to carry and protect its eggs or young, at which time they extend very considerably, and form a kind of pouch. We have seen this receptacle distended with ova, from fifteen to twenty, readily distinguished through the transparent plates. In this part a very strong pulsation is observable.

"While examining a female in a watch-glass of sea-water

* Vol. vii. p. 67.

under a microscope, we were agreeably surprised to observe not less than ten young ones crawl from the abdominal pouch of the parent, all perfectly formed, and moving with considerable agility over the body of the mother, holding fast by their hind claws, and erecting their heads and arms. On a small species of *Fucus* a vast number of these curious insects were collected, of both sexes, and of all sizes. When at rest, they only held by their hind claws; in motion, the arms were also used, and the progression was somewhat similar to that of the looper caterpillars, or larvæ of the moths of the Linnæan division of *Geometræ*."

CAPRELLA SPINOSA, Goodsir.—Similar to last; differs chiefly in the first thoracic segment having five spines; the segments are considerably longer; the first pair of feet are minute and slender. Of a pale white-colour; the eyes black. An inch long.

Firth of Forth (Goodsir).

Mr. Bate refers this with doubt to the genus *Protella* of Dana, and to the species named *Ægina longispina* by Kroyer.

Gen. 105. PROTO, *Leach*.

All the rings of thorax furnished with legs: there are seven pairs of these organs; the second, third, and fourth pairs have a vesicular appendage at their base.

PROTO PEDATA, *Leach*. *Müller's Spectre Shrimp*.—Upper antennæ very long, lower antennæ very short. Fifth pair of legs very short; palm of second jaw-foot convex and slightly denticulated.

South coast of Devon (Montagu); Plymouth (Mr. Spence Bate); Bell Rock (Dr. Fleming); Berwick Bay (Dr. Johnston); Moray Firth (Rev. G. Gordon).—Desmarest found this species abundantly on sponges, and fancies that it feeds on the substance of the animal which forms them.

PROTO GOODSIRII (Spence Bate) differs chiefly from the preceding in the palm of second jaw-foot being concave.

Moray Firth (Rev. G. Gordon).

FAM. *CYAMIDÆ*.

Body depressed, oval. Eyes compound; two very small ocelli on vertex; antennæ very close together at the base. Five pairs of legs, more or less prehensile; second and third

joints of the thorax without legs, but bearing very long cylindrical respiratory appendages, which are generally bent over the back.

The species of this family are parasitic on the whale and dolphin. They gnaw the rough thick skin of these marine animals more or less deeply. There seem to be several species of *Cyamus*, attacking different parts of the bodies of these bulky beasts, some preferring the head and others the fins and other parts of the body.

Gen. 106. CYAMUS, *Latr.*

Head small, truncated, united to first thoracic segment. The characters of the genus are those of the family.

CYAMUS CETI. *Whale Louse*. (Plate XI. fig. 6.)—Branchial appendages simple, and furnished at the base with two unequal and pointed appendages.

Under the fins, etc., of the whale.

CYAMUS OVALIS.—Body much wider than in last; four pairs of branchial appendages in both sexes, those of third ring with a single short slender appendage at the base, those of the fourth ring with two of unequal length.

Lives in clusters on the hard projections of head of whale.

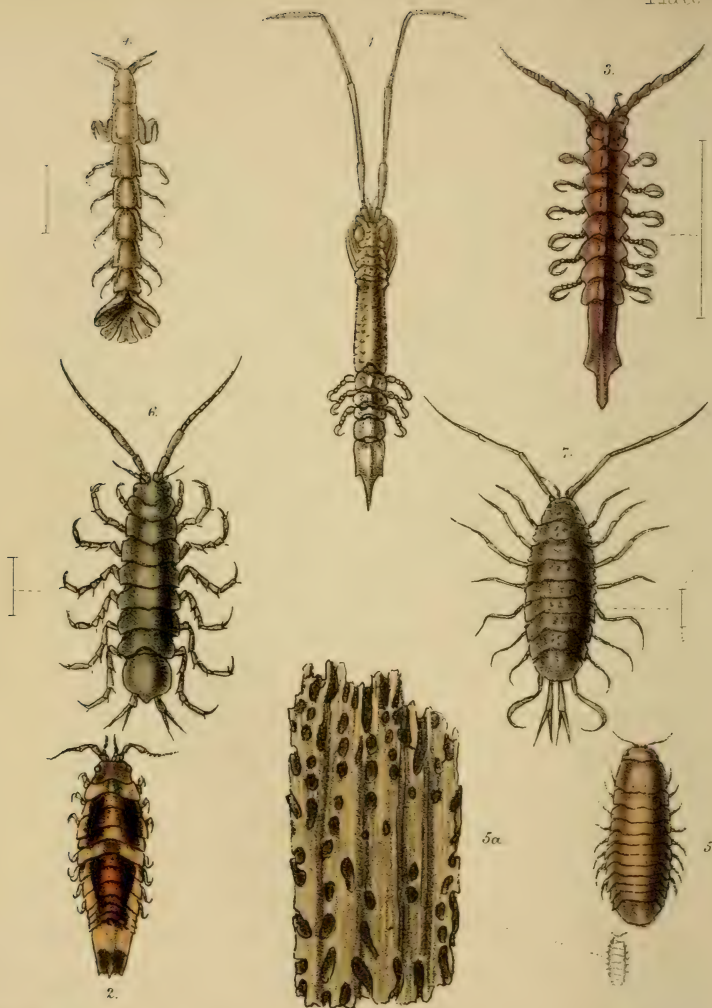
The *Cyamus gracilis* and *Cyamus Thompsoni* are also re-

corded as British; the latter was found on a dolphin, and is described by Mr. Gosse.

ORDER III. *ISOPODA*.

Most of the Crustacea of this distinct Order would have been included in the genus *Oniscus* of Linnæus. The abdomen is much developed; the body is depressed, in general rather wide and divided into segments. There are generally fourteen legs, which terminate in a pointed claw. The most of these legs in the female have a large horny plate, extending horizontally inwards, and forming with the others a large pouch beneath the thorax, which contains the eggs. Mouth-apparatus well developed. Many of the rings of the abdomen are often confounded together, so as to appear a single joint. The tail is formed of a variable number of segments bearing the branchiæ, and often furnished with plates which cover them. Many of the species form the favourite food of fish, and the remains of them are often met with in their stomachs.

The first Suborder contains the Walking Isopods, in which the last false legs are styliform or opercular, but never form a lamellar caudal fin.



Sowerby del. et lith.

Vincent Brooks Imp.

1. *Arcturus longicornis*. 2. *Notica truncatidana*. 3. *Idotea appendiculata*. 4. *Anthura gracilis*. 5. *Limnoria lignorum*. 5a. Wood bored into by ♂♂. 6. *Asellus aquaticus*. 7. *Isotocoda maculosa*.

FAM. IDOTEIDÆ.

Terminal appendages of the last false legs very large, lamellated, covering all the lower surface of the abdomen, and not projecting beyond the first segment, which is shield-like and very large.

Gen. 107. ARCTURUS, *Latr.*

Body long; the four first pairs of legs lamellar at the end, not fitted for walking or seizing; the three last pair of legs formed for walking. Antennæ like legs, and employed in seizing and enclosing the prey: the young of the great Arctic species adhere to these organs by the legs.

ARCTURUS LONGICORNIS, Sowerby, sp. (Plate XII. fig. 1.)
—This species and the two next have the fourth ring of thorax as long as all the others together. The body of this is rugose, and, with the antennæ, is nearly an inch long.

The eggs are red, and adhere to the under side of the largest segment of the body.

First observed by Mr. T. W. Simmons, entangled in the nets of the fishermen, off Dysart, near Inch Keith (Sowerby); Cullercoats, Northumberland (Dr. Clarke); Falmouth and Firth of Clyde (Rev. A. Norman); Berwick (Dr. Johnston).

ARCTURUS INTERMEDIUS, Goodsir,* sp.—Resembles the last, but its prominent parts are more boldly thrown out : upper antennæ are longer than two first joints of the lower ; a double row of tubercles on each side of the body. Length from four to five lines ; straw-coloured, spotted with brown.

Firth of Forth (Mr. H. Goodsir).

ARCTURUS GRACILIS, Goodsir, sp.—Slender, quite smooth ; upper antennæ nearly as long as the three first joints of the lower. Dirty-white, with brown spots. Length, seven lines.

Firth of Forth, off Anstruther (Mr. H. Goodsir).

Mr. Goodsir has had all the species alive. They select a branch of coralline and keep that branch exclusively to themselves, defending it with the greatest vigour against all intruders ; they use the true thoracic feet to fix themselves. Their natural mode of progression is swimming. “It is amusing to see one of these animals resting, in an erect posture, on a branch of coralline, by means of its true thoracic feet, waving its body backwards and forwards, throwing about its long inferior antennæ, and ever and anon

* Goodsir, “On two new species of *Leachia*,” Edin. New Phil. Journal, Oct. 1841. Mr. Goodsir restricts the name *Arcturus* to the Arctic species, and applies Dr. Johnston’s name *Leachia* to the three British species.

drawing them through its anterior fringed feet for the purpose of cleaning them. It frequently darts from its branch, with the rapidity of lightning, to seize with its long antennæ some minute crustaceous animal, and returns to its resting-place to devour its prey at leisure."

Gen. 108. IDOTEA.

All the legs ending in a pointed claw, and so adapted for walking; abdomen furnished beneath with two large simple plates, which do not extend beyond the side of the terminal segment. Body considerably elongated, and not much dilated about the middle. The various species are found amongst seaweeds near the shore.

IDOTEA PELAGICA.—Front slightly notched; second joint of abdomen with a small keel down the middle, rounded at the end, and with a blunt tooth in the middle; antennæ one-third the length of the body.

Found at different parts of the coast. Common on the Bell Rock.

IDOTEA TRICUSPIDATA. *Three-toothed Idotea*. (Plate XII. fig. 2.)—Body elongated, nearly linear. Cinereous, dotted with brown; the back marked with a yellowish-white lon-

gitudinal line. The tail with three teeth, the middle one longer than the others. The antennæ reach to the third ring of body.

Not uncommon on the coast.

IDOTEA EMARGINATA. *Notched Idotea*.—Body oval, elongated. Tail truncated, notched. Antennæ one-third the length of the body. Reddish-yellow or cinereous; sides and end of tail always pale.

British coast.

IDOTEA LINEARIS. *Slender-bodied Idotea*.—Body elongated, linear; tail somewhat contracted at the base, with the end dilated, truncated, notched, and with a tooth at each side; blackish brown-above, whitish on the sides. Outer antennæ of the length of the body; the third joint longer than the fourth.

South coast of England; Ilfracombe.

IDOTEA ACUMINATA.—Body of an oblong oval shape; tail rather sharply keeled down the middle; the keel produced into a point; colour, yellowish or reddish, with three longitudinal rows of dusky spots.

Coast of Devon.

IDOTEA APPENDICULATA. (Plate XII. fig. 3.)—Body very narrow, and deeply toothed on the sides. Abdomen lan-

ceolate. Legs very slender, and placed near the side of the thorax.

Coast of Devon; Sidmouth.

Gen. 109. *ANTHURA*, *Leach*.

Body very slender; antennæ very short, of six or eight joints. Tail furnished with two plates on each side. First pair of legs with a small, slightly swollen hand, which is subchelate, the six following pairs slender.

ANTHURA GRACILIS, Montagu, sp. (Plate XII. fig. 4.)—Body nearly cylindrical; head elongated, and nearly as wide as the thoracic segments; last segment of abdomen rounded at the end.

Coast of Devon.

FAM. *ASELLIDÆ*.

End of the abdomen with style-shaped appendages. Body more or less elongated and often linear; first pair of antennæ very small, inserted near the median line; abdomen of several distinct joints, the last large and shield-shaped.

The species of this family are all aquatic. Some of

them (the *Apseudidæ*) have the first pair of legs ending in a two-clawed hand, while in the others (*Limnoriadæ*) the first pair of legs resembles the others.

Gen. 110. APSEUDES, *Leach*.

Body elongated, depressed, nearly of same breadth throughout. First pair of antennæ short, slender, with many-jointed thread at end; second pair outside the first, thick and rather long; peduncle of four joints, succeeded by a many-jointed thread; the first pair of legs short, with a large swollen hand; second pair wide, flattened, spiny, and apparently adapted for digging; the five last pair slender. Abdomen ending in two long threads.

APSEUDES TALPA, Montagu, sp. *Mole Hog-louse*.—Yellowish-white. Head pointed. First five segments of abdomen very hairy on the sides, the last as large as all the others taken together.

Coast of Devon (Salcombe). It was first observed there by Colonel Montagu, who remarked that the two long caudal setæ are capable of closing together instantaneously. It is about four lines long.

Gen. 111. TANAIS, *Milne-Edwards*.

Similar in many respects to the last. Antennæ very short, without many-jointed thread at the end. Second pair of legs similar to the following pair. The three first rings of abdomen more developed than the following.

TANAIS DULONGII, Audouin, sp.*—Upper antennæ much thicker, but scarcely longer than the lower. Five last pairs of legs nearly of the same length. Abdomen without hairs on the sides. Two lines long.

Irish coast, Giant's Causeway (W. Thompson).

Gen. 112. LIMNORIA, *Leach*.

Body capable of being contracted nearly into a ball. Eyes distinct, granular. Tail of many segments, scarcely narrower than the body, the last somewhat rounded. Antennæ in pairs, one placed over the other.

LIMNORIA LIGNORUM, Rathke, sp. *Boring Limnoria*. (Plate XII. fig. 5.)—Body ash-coloured; eyes dark-brown. Woodwork in the sea. Common.

This very destructive little boring creature was first

* Westwood proposes to separate this species under the name of *Anisochæirus*. Ann. Sc. Nat. xxvii. p. 330.

described as British by Dr. Leach.* It was sent him by Mr. Stevenson, the builder of the Bell-rock light-house. Dr. Leach† remarks, "It occurs in the greatest abundance at the Bell Rock, in the old woodwork used whilst the light-house was building, which it perforates in a most alarming manner, entering to the depth of two inches or more, boring in every direction. They seldom or never deviate from a straight line in their perforations, unless interrupted in their progress by a knot in the wood, when they pass round it. The female is one-third larger than the male, and may be readily distinguished by its pouch, which is easily seen, and in which the eggs and young ones after their exclusion are carried. The young ones in those I examined were generally seven in number, in some few nine, and in one instance only five." One of the authors of the 'Introduction to Entomology,'‡ says that in December, 1815, he was favoured by Mr. Lutwidge of Hull, "with specimens of wood from the piers at Bridlington Bay, which wofully confirm the fears entertained of their total ruin by the hosts of

* Rathke described it in 1799 as the *Cymothoa lignorum* (see Skrivt. af Naturh. Selsk. v. 101, t. 3, f. 14). It is the *Limnoria terebrans* of Leach. Dr. Coldstream has published an elaborate monograph on *Limnoria* in vol. xvi. of the Edin. New Phil. Journal.

† Linn. Trans. xi. 371.

‡ 6th ed. vol. i. p. 203.

these pigmy assailants that have made good a lodgment in them, and which, though not so big as a grain of rice, ply their masticatory organs with such assiduity as to have reduced great part of the woodwork which constitutes their food, into a state resembling honeycomb. One specimen was a portion of a three-inch fir-plank nailed to the north pier about three years before, which is crumbled away to less than an inch in thickness; in fact, deducting the space occupied by the cells which cover both surfaces as closely as possible, barely half an inch of solid wood is left; and though its progress is slower in oak, that wood is equally liable to be attacked with it. If this creature were easily introduced to new stations, it might soon prove as destructive to our jetties as the *Teredo navalis* to those of Holland, and induce the necessity of substituting stone for wood universally."

It has been found at various parts on the coast, as, for instance, on the shores of the Firth of Forth, where Dr. Coldstream observed it, and made it the subject of an excellent memoir. Dr. Moore, in 'Charlesworth's Magazine of Natural History,' stated that for forty years its injurious powers had been known in the harbour of Plymouth, where it is called "the gribble." It has been found on

various parts of the Irish and Scottish coasts, sometimes associated with an almost equally destructive Crustacean already described, the *Chelura*.

Gen. 113. ASELLUS, *Geoffr.*

Caudal appendages long. Front legs the largest; claws simple. Eyes small, lateral. Lower antennæ of the same length as the bristle-bearing joint of the outer pair. Body oblong, depressed, and deeply divided into nine joints; one being the head, seven the thorax, and one the abdomen.

ASELLUS AQUATICUS, L. *Water Hog-louse*. (Plate XII. fig. 6.)—Head large; inner antennæ shorter than peduncle of second pair; peduncle of posterior appendages of abdomen cylindrical, with two stylets of same length. Six or seven lines long.

Common in fresh and stagnant water: the male much larger than the female. Its usual walk is slow, but when pursued it can run quickly.

Gen. 114. JÆRA, *Leach*.

Caudal appendages very minute. Front legs not thicker

than the others. Eyes moderate. Legs provided with bifid claws.

JÆRA ALBIFRONS, Leach. *White-fronted Hog-louse*.—Ash-coloured, with the forehead whitish; eyes placed close to each other.

Sea-coast, very abundant among seaweeds and under stones, in many parts of the British Islands.

Gen. 115. MUNNA, Kroyer.

Eyes pedunculated, immovable; filiform part of upper antennæ double; walking legs very long. Eggs carried in a large oviferous pouch situated between the thoracic legs, and composed of four large plates.

MUNNA KROYERI, Goodsir. *Long-legged Hog-louse*. (Plate XIII. fig. 3.)—Eyes very prominent, and the whole body very spiny, and of an ochrey-brown hue; first pair of legs prehensile.

Length of body one line; span of legs three lines.

Firth of Forth (H. Goodsir). It is quick and active in its movements, running along the branches of the smaller corallines with great rapidity. Mr. Goodsir never observed it swim; in fact, it is not adapted for that mode of pro-

gression ; when pursued along the bottom, it runs quickly, but often stops suddenly, turns round, and becomes assailant.

Gen. 116. ONISCODA, *Latr.*

Caudal appendages long. Front legs largest ; claws bifid. Eyes moderate, somewhat vertical ; antennæ four ; the lower shorter than the bristle-bearing joint of the outer pair.

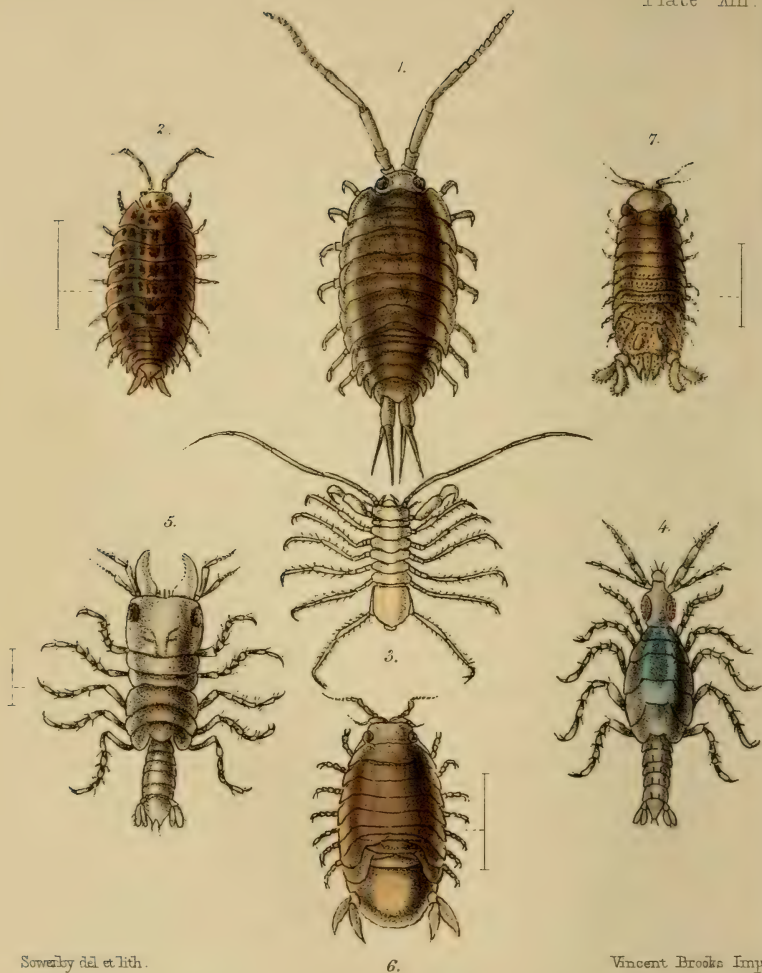
ONISCODA MACULOSA, Leach. *Spotted Hog-louse*. (Plate XII. fig. 7.)—Body ash-coloured, varied and spotted with brown.

In the sea, among Algæ.

FAM. ONISCIDÆ.

The species of this family appear to have only one pair of antennæ ; the other pair being in a rudimentary state. Abdomen formed of six perfectly distinct segments ; the last of these does not acquire the dimensions which it exhibits in the other *Isopoda*, where it serves as a shield to the false branchial feet ; it is, on the contrary, very small, and sometimes even rudimentary. Their legs are slender.

The species of *Oniscidæ* are not so aquatic as the other



Sowerby del. et lith.

Vincent Brooks Imp.

1. *Lygia oceanica*. 2. *Porcellio scaber*. 3. *Munna Kroyeri*. 4. *Piraniza ceruleata*.
5. *Ancus maxillaris*. 6. *Spharisma serratum*. 7. *Cymodoeca emarginata*.

members of this order. Most of them live always on the ground, while others live long out of the water without suffering. None of them however live long in very dry places; damp appears to be necessary to their existence.

There are two divisions of the family: in the first, one British species only occurs, the *Ligia oceanica*. The basal joint of the last false legs is slender, elongated, and completely exposed, and ends in two much-elongated, style-shaped appendages. In the second division, containing *Oniscus*, *Philoscia*, and *Porcellio*, the basal joint of the last false legs is short, and does not reach beyond the end of the last segment of the abdomen.

Gen. 117. LIGIA, *Fabr.*

Outer antennæ with the last joint compound; inner antennæ very short. Caudal appendages, two on each side, inserted close together at the tip of a small joint attached to last segment of abdomen.

LIGIA OCEANICA, Linn. sp. *Great Sea-Slater*. (Plate XIII. fig. 1.)—Back of segments rough with depressed granules. Antennæ not quite so long as the body. Varies much in colour, in size, and in the number of the joints of the outer antennæ.

Sea-shore, very abundant.

The species occur in moist places, under stones and slates. The female carries her eggs and even her young beneath the thorax; the young have at first only six thoracic rings and six pairs of walking legs; the seventh ring is rudimentary. These Crustacea seem to feed indifferently on vegetable and animal matters, and are themselves preyed on by birds.

Gen. 118. ONISCUS, *Latr.*

Outer antennæ with the base concealed by the projecting front margin of the head; these appendages are eight-jointed; the tail appendages are four-, the side ones two-jointed.

ONISCUS ASELLUS, L. *Land-Slater*.—Body smooth, of a darkish-grey above, with two rows of yellow spots on the back, and on each side two rows of whitish spots; the under side of the body whitish.

Very common in gardens and damp houses.

Gen. 119. PHILOSCIA, *Latr.*

Outer antennæ exposed at the base, with eight joints.

Tail abruptly narrower than the body; its appendages are four, the side ones being two-jointed.

PHILOSCIA MUSCORUM, Scop.—Body above ash-brown or reddish, sprinkled with little dots and marks of grey or yellow, under side whitish.

In damp places, as among the moss at the roots of trees.

Gen. 120. PORCELLIO, *Latr.*

Outer antennæ with seven joints, by which character it is chiefly distinguished from *Oniscus*. In Scotland these creatures are commonly called “Scalers.” Dr. Asa Fitch* has well described the use of these common little Crustaceans. He says that they are “everywhere common about the roots of trees, under logs and stones, in the crevices of the foundation walls of our buildings, and in our cellars; and they are particularly numerous under any logs or billets of wood. They occur, in short, in all situations that are damp, cool, and dark. Frequently by night, in wet weather, they crawl about the rooms in our dwellings. They are perfectly

* First Report on the Noxious, Beneficial, and other Insects of the State of New York, p. 118. Albany, 1855.

innocent and harmless, subsisting upon decaying vegetable and animal substances. They afford a dainty bit to domestic fowls, which devour them with avidity, and are always scratching our yards in search of these more than any other article of diet. This is their chief importance in an economical aspect, and being so abundant they form an item of no small value to the poultry-breeder, though one of which but little notice is taken. In former times the species of this family were highly reputed for their supposed medicinal virtues, and old books upon the *Materia Medica* inform us that when dried and pulverized 'they have a faint, disagreeable smell, and a somewhat pungent, sweetish, nauseous taste, and are highly celebrated in suppressions, in all kinds of obstructions of the bowels, in the jaundice, ague, weakness of sight, and a variety of other disorders.' And the wine of *Millipedes*, prepared by crushing these animals, when fresh, and infusing them in 'Rhenish wine,' is spoken of as 'an admirable cleanser of all the viscera, yielding to nothing in the jaundice and obstructions of the kidneys.' In the light of modern science we can impute the cures attributed to these creatures only to the effect produced upon the imagination of the patient, and the curative powers of nature, for, beyond some slight demulcent qualities, they must be

wholly inert, and are now wisely discarded from the pharmacopœias."

The species of this country have not been much investigated, and there is little doubt that some of the many species recorded in Brandt's 'Conspectus of the *Oniscidæ*,' will be found to be indigenous. Among those recorded may be specified—

PORCELLIO SCABER, Latr. (Plate XIII. fig. 2.)—Body oval, wide, and covered with roughnesses, largest on the head and thorax, and very small on the abdomen. The frontal median lobe of the head is entire and triangular. It is of a darkish lead-colour, often varied with whitish blotches.

Common under stones and among rotten wood.

PORCELLIO LEVIS, Latr.—Body smooth; head with the front arcuated, the middle lobe very little developed; of a uniform greyish-brown; below the knees of each leg there is a dusky spot.

In similar localities as the former, but not so common.

FAM. ARMADILLIDÆ.

Of an oval form; the posterior appendages of the ab-

domen fill up the notch between the two last rings, and do not extend beyond the edge. When touched, they have the power of rolling themselves into a ball.

Gen. 121. ARMADILLO, *Latr.*

Latreille gave this name to these creatures from their habit, when disturbed or alarmed, of rolling themselves into a ball, like the curious, jointed, mailed mammalia of South America commonly so called. In some places they are called "pill-beetles," the former part of the name derived from their appearance when rolled up being that of a pill. The last false feet have the basilar joint very large, and almost entirely filling up the notch between the fifth and sixth segment of abdomen. The body is highly convex above, and very blunt at both extremities. The outer antennæ are seven-jointed, inserted in a hollow of the front; the lateral caudal appendages do not project; the apical joint triangular.

ARMADILLO VULGARIS. *Pill Beetle*.—Body smooth, of a greyish-brown hue, with the hind margin of the rings of a yellowish hue.

Not uncommon in different parts of the country.

The next sub-order of the *Isopoda* contains those species which can swim; the abdomen ends in a large fin, furnished,

on the sides, with lamellar pieces belonging to the last pair of false legs; the last segment of the abdomen is always lamellar and much larger than the segments before it. The legs are short, and formed for walking or for holding on.

FAM. *PRANIZIDÆ*.

In this family the thorax is composed of five rings, and the limbs corresponding to the two first pairs of legs are rudimentary, or wanting. The five last pairs of legs are slender and formed for walking. Abdomen narrow, but well developed.

Gen. 122. *PRANIZA*, *Leach*.

Pranizæ are minute marine Crustacea. By means of their legs they can creep on the bottom, which they do slowly; but they swim with greater rapidity, propelling themselves forwards by the quick motions of a series of ciliated fins placed beneath the tail. Of their economy nothing is known. They are characterized by having four unequal antennæ; two sessile eyes; an elongated body divided into three segments, of which the two anterior, or thoracic, are very small, and the third, or abdominal, very large. They have ten legs, a

HISTORY OF BRITISH CRUSTACEA.

pair to each segment of the thorax, and three pairs to the abdomen ; while the jointed tail is armed beneath, and at its end, with foliaceous appendages, that appear to be both motive and respiratory organs.* The head is small and rounded, and the mandibles are concealed.

PRANIZA CÆRULEATA, Montagu, sp. *Bluish Praniza*. (Plate XIII. fig. 4.)—Abdominal segments blue ; last segment of abdomen bifurcate at the top ; a line and a half in length.

Hab. Shores of Devon (Montagu, Linn. Trans. xi. 15, t. 4, fig. 2) ; the male is found usually on rocks, while the female seems to be generally fixed to the branchiæ of different fishes.

Montagu, Otto, and Westwood, from finding the *Pranizæ* amongst parasitic Crustacea, etc., conclude that like the *Caligi* they are found on fish. M. Audouin† mentions that he and Edwards met with them amongst small Crustacea on the shore of the English Channel, at low water. They were free, and walked about among the seaweeds with their legs. They employ their abdominal appendages in swimming, and have the pieces of their mouths constantly in a state

* Johnston, Mag. Nat. Hist. v. 521.

† Note to Westwood's paper, Ann. Sc. Nat. xxvii. p. 327.

of motion, like those of the *Decapoda*. Mr. Halliday informs us that the young *Pranizæ* are of the same form as the adults.

Risso has described two Mediterranean species (H. N. Eur. Mer. v. 33). One of these lives in numbers in the interstices of madrepore tufa, formed at great depths in the sea; it is an active species, and sometimes fixes itself to the gills of the *Physis tinca*, a species of fish. Both these *Pranizæ* usually cling to seaweeds and corallines, and when they leave them, they swim with great quickness, and being very nimble, elude the grasp of any one who tries to catch them.

PRANIZA FUSCATA, Johnston.*—Abdominal segment reddish-brown, two lines long, subcylindrical. Head, thorax, tail, and legs colourless and transparent; eyes black, great segment of a reddish-brown. Head pointed. Antennæ lateral, four-jointed, the ultimate joint long and divided by many transverse lines. Eyes lateral, large, compound, like those of insects. Thoracic segments very small, with a pair of legs to each; abdomen ovate, with a translucent edge, furnished with three pairs of legs, one from the anterior margin, one from the middle, and one from a projecting

* Mag. Nat. Hist. v. 521, f. 99.

tubercle at the base. Legs taper, five-jointed, armed with a simple nearly straight claw. Tail straight, five-jointed; joints equal, distinct, armed on the under side with four rows of compressed fins ciliated on the margins, and the ultimate joint terminated besides with four similar appendages and a triangular process between them.

The large segment is, in some specimens, smooth and even, but in others it is raised at the top into two oval bosses that greatly resemble the elytra of a *Meloe*, and are beautifully punctured. The same parts are visible on the ventral surface in *both* varieties, but much smaller in that whose back is smooth. It may be a sexual distinction.

A letter from A. H. Halliday, Esq., dated October 9, 1847,* conveyed the following information: "I found a species of *Praniza* pretty common on the clayey shores of Strangford Loch last week, in company with *Anceus maxillaris*. They were in small cavities on the surface of the clay, under stones, sometimes singly, oftener two, or even three and four in each hole; the smaller slender green ones were few in comparison. You will find some of the new-born young with them, having all the characteristic form of the parent, but the posterior thoracic segments not so completely confounded

* Ann. and Mag. Nat. Hist. n. s. 1848, vol. i. p. 65.

together. I have given but a hasty look at them, but have not recognized males among the adults."

FAM. *ANCEADÆ*.

Head very large, and armed in front with two great jaws resembling a pair of pincers.

There is some likelihood that *Anceus* may prove to be one of the stages of *Praniza*.

Gen. 123. *ANCEUS*, *Risso*.

Head large, four-sided, nearly as large as the thorax, which has five distinct segments; the jaws are large and prominent.

ANCEUS MAXILLARIS, Montagu, sp. *Ant-like Jaw-bearer*. (Plate XIII. fig. 5.)—About a line and a half long. It is found in the same places as *Praniza*, and has been thought by some naturalists to be the other sex.

South coast of England, where it was first noticed by Colonel Montagu. Mr. Halliday found it on the clayey shores of Strangford Lough, in Ireland, associated with *Praniza*.

FAM. SPHÆROMIDÆ.

Thorax of seven distinct segments, generally all capable of motion; seven pairs of legs almost equally developed. Abdomen very large; the five first rings of the abdomen slightly developed, and generally united; the last false legs terminating in one or two plates, the outer one only movable. Head large and transverse. The legs only adapted for walking.

Most of the species can contract themselves into a ball when alarmed, and some of them have the power of making holes in the softer rocks.

Gen. 124. SPHÆROMA, *Latr.*

Eyes not reaching the front margin of the first segment of the body. Body seven-jointed. Tail entire at the tip, the base on each side furnished with two equal leaf-like appendages; outer plate of last false legs folded under the inner one.

Dr. Johnston (Zool. Journ. iii. p. 181) describes the *S. rugicanda* as swimming with considerable velocity, and often on its back. It contracts itself into a ball when alarmed; and it can live a considerable time out of the water.

SPHÆROMA SERRATUM, Fabr. sp. *Serrated Sea Pill-ball*. (Plate XIII. fig. 6.)—Body smooth; tail very smooth, obliquely truncated on each side, the lamellæ elliptical, sharp, the outer serrated externally.

Of an ashy colour, or whitish marbled with red.

Rocky shores; very common.

SPHÆROMA RUGICAUDA, Leach. *Rough-tailed Sea Pill-ball*.—Body smooth; tail rough, with its lamellæ rounded, the outer scarcely toothed externally. Body ash-coloured, lineated, and spotted with black.

Island of Ulva; where it was found by Dr. Leach. Berwick-upon-Tweed (Dr. Johnston).

SPHÆROMA HOOKERI, Leach.—Body smooth; the last joint of the tail furnished with two oblong tubercles. Ash-coloured or reddish, with minute black punctures.

Coast of Suffolk, whence it was sent by Sir Wm. Jackson Hooker to Dr. Leach. The Rev. Alfred Norman finds it at Clevedon and in Guernsey.

There are other recorded British species, but they are but imperfectly characterized.

Gen. 125. CYMODOCEA, *Leach*.

Eyes reaching the front margin of the first segment. Body seven-jointed; not capable of being completely rolled into a ball. Tail on each side at the base furnished with two slightly-compressed appendages, outer largest; tip notched. Front of head swollen, and not produced above the base of the antennæ.

CYMODOCEA TRUNCATA, *Leach*.—Body slightly granulated, its terminal appendage entire and truncated at the end; third and fourth joints of abdomen with two dorsal tubercles, the hind ones the largest.

Coast of Devonshire (Montagu); dredged in Lamlash Bay, in the Isle of Arran, by the Rev. Alfred Norman, and found by the same gentleman under rocks, low-water, at Herm. Belfast Bay (Thompson).

CYMODOCEA EMARGINATA, *Leach*. (Plate XIII. fig. 7.)—Abdomen with its terminal segment notched at the end; third and fourth joints each furnished with two tubercles, of which the latter is the largest.

Mount Edgecumbe, near Plymouth, and Falmouth.

CYMODOCEA MONTAGUI, *Leach*.—Body somewhat linear; sixth segment of thorax with a prolongation, which is flattened above.



Sowerby del. & lith.

Vincent Brooks Imp.

1. *Nesaea bidentata*. 2. *Campocopea hirsuta*. 3. *Girolana Cranchii*. 4. *Eurydice pulchra*. 5. *Ega bicarinata*. 6. *Conilera cylindracea*. 7. *Rocinela monophthalma*. 8. *Ione thoracica*. a, male, b, fem. 9. *Phryxus Hippolytes*. a, male, b, female.

Coast of Devon. This and the following species swim with great swiftness and elegance, and can execute rapid and varied evolutions.

CYMODOCEA RUBRA, Leach.—Of a red colour; body somewhat linear, fissure of last joint equal in breadth throughout, sixth segment without prolongation.

Coast of Devon. Cumbræ, Firth of Clyde (Rev. Alfred Norman).

CYMODOCEA VIRIDIS, Leach.—Of a green colour; body nearly oval; fissure of last segment of abdomen very wide at the base.

Coast of Devon.

Gen. 126. NESÆA, *Leach*.

Last segment of the tail (last false legs) on each side with a straight, slightly compressed appendage. Body six-jointed; last joint larger than the rest. Antennæ setaceous, nearly equal, upper with a very large peduncle, two-jointed, basal joint the larger.

NESÆA BIDENTATA, Adams. *Adams's Sea Pill-ball*. (Plate XIV. fig. 1.)—Body smooth, sixth ring terminated behind by two sharp points; abdomen with its last ring

rugose, and with two tubercles. Of an ash-colour, slightly streaked with blue or red. About four lines long.

British coast. Cornwall (Polperro). Vagon Bay, Guernsey (Rev. Alfred Norman).

Gen. 127. CAMPECOPEA, *Leach*.

Last segment of the tail with a curved compressed appendage on each side. Body six-jointed, last joint same size as the rest. Antennæ setaceous, upper longest, peduncle two-jointed; a very ample space between the antennæ.

CAMPECOPEA HIRSUTA, Montagu, sp. (Plate XIV. fig. 2.)
—Of a brown colour, the last segment of abdomen marked with some pale blue spots; body covered with short hairs. Length $1\frac{1}{2}$ line.

Hab. South coast of Devonshire.

CAMPECOPEA CRANCHII, Leach.—Slightly hairy; sixth ring simple, without spines.

Falmouth (Cranch.)

FAM. CYMOTHODÆ.

Thorax of seven rings, movable on each other; the first

five rings of abdomen in general well developed and almost always distinct from each other; the last false legs terminating in two plates. Head generally small. First three pairs of legs generally (or sometimes all) with a strong claw, enabling most of the species to attach themselves to fish and to hold on.

Most of the species are more or less parasitic, being attached to fish, to which they can adhere by means of their strongly-hooked legs. In some parts of the United States* the fishermen say that the fish-lice are "necessary to the life of the fish, and as a proof of it, they observe that if the *louse* be taken from him, the fish will die, although thrown into the water; but it is probable that the death of the fish is not owing to the removal of the parasite, but to its being withheld too long from the water."

Gen. 128. CIROLANA, *Leach*.

Abdomen six-jointed. Eyes granulated. Small plates of the posterior ventral appendages larger and wider than the inner. The legs have very small claws, and are adapted for walking.

CIROLANA CRANCHII, *Leach*. (Plate XIV. fig. 3.)—

* Say, Journal Acad. Nat. Sc. Phil. i. p. 396.

Body smooth, punctured; last joint of abdomen triangular, rounded at the end.

West coast of England, where it was found by Mr. Cranch, after whom it was named by Dr. Leach. The generic name, as well as that of *Conilera* and *Rocinela*, were formed by Dr. Leach from the word Carolina by transposing the letters, and by changing one of the *a*'s into an *e* in the two latter names.

CIROLANA HIRTIPES, M. Edw.—A larger species than the last, and distinguished by its very hairy legs, was found on the Irish coast by the late Mr. Thompson of Belfast. Professor M. Edwards describes it as a native of the Cape of Good Hope.

Gen. 129. EURYDICE, *Leach*.

Eyes distinct, lateral, not granular. Upper antennæ with the basal joint of moderate size. Body seven-jointed. Tail six-jointed, last joint the largest. Lower antennæ of the length of the body.

EURYDICE PULCHRA, *Leach*.—Of an ashy colour, beautifully variegated with black; last joint of the tail semi-oval.

Bantham, South Devon; found in the sea; it swims very

quickly. In Ireland it has been found at Larne and at Carrickfergus (Thompson).

Gen. 130. *ÆGA, Leach.* FISH-LOUSE.

Eyes large, granular, oblong, oblique, marginal. Upper antennæ with a very large basal joint, which, with the second, is wide and compressed. Body seven-jointed. Tail six-jointed, last joint the largest, the base on each side furnished with two leaf-like appendages.

ÆGA BICARINATA, Leach. (Plate XIV. fig. 5.)—Last joint of abdomen with two oblique keels; its extremity truncated and notched.

British coast, rare.

ÆGA TRIDENS, Leach.—The last joint of the tail with three keels, which are produced beyond the tip into teeth, the inner process truncated.

Scotland (Dr. Leach); Ireland, Belfast (Col. Portlock).

Gen. 131. CONILERA.

First two joints of upper antennæ nearly cylindrical. Eyes small, separate, not at all prominent. Sides of the segments of abdomen nearly straight.

CONILERA CYLINDRACEA, Montagu, sp. (Plate XIV. fig. 6.)—Body smooth, not punctured; last joint of abdomen longer than wide, rounded at the end and the sides, arched about the middle.

Coast of Devonshire (Montagu).

Dr. Lukis of Guernsey has kindly informed me of the habit of this species. He took upwards of a dozen feeding together within the orbit of the whiting. The globe of the eye was nearly detached from the surrounding parts. The fish was large and did not seem out of condition. The *Conilera* must have been there some time, as they were remarkably blanched (Letter, July 18, 1856).

Gen. 132. ROCINELA, *Leach*.

Two first joints of upper antennæ nearly cylindrical. Eyes very large, somewhat convex, converging in front and nearly approaching.

ROCINELA DANMONIENSIS, *Leach*.—Of a horn-colour, with dark-coloured eyes.

Plymouth Sound (Dr. Leach).

ROCINELA MONOPHTHALMA. (Plate XIV. fig. 7.)—Eyes nearly occupying the whole surface of the head.

Berwickshire, found by the late Dr. Johnston on codfish, and on the coast of Northumberland, by Mr. Howse.

Tribe EPICARIDITA.

The species of this curious tribe are all completely parasitic, and confined to members of the same class. The females gradually grow larger and more deformed, while the males remain very small, and in their structure have more resemblance, than their partners, to the ordinary *Isopoda*. In both, the antennæ are more or less rudimentary; the feet are very short, and adapted for laying hold. The abdomen is slightly developed, and is gradually contracted to the extremity; its sixth segment is very small and without appendages, or furnished only with two membranous unjointed filaments; the mouth is furnished with lamellar jaw-feet and mandibles which have no palpi; all the parts of the mouth seem adapted for suction, as well as for the division of solid food. In the male, the body is formed of thirteen or fourteen distinct joints; one forming the head, seven the thorax, and five or six the abdomen. In the females, the rings of the abdomen, and even those of the whole

body, are confused together, the thorax is very wide, and the eyes cease to be visible.

FAM. *IONIDÆ*.

Abdominal appendages filiform and surrounding the abdomen.

Gen. 133. *IONE*.

Body, in the female, pyriform and very flat, in the male, narrow and elongated; the abdomen of six segments, each bearing a pair of membranous, cylindrical, slender, very long appendages; in the female the appendages, fixed to the five first segments, are very long and arborescent. The head of the male has two pairs of antennæ.

IONE THORACICA, Montagu, sp. (Plate XIV. fig. 8.)—Colour generally orange, appendages whitish; male much more slender, and without cirri on front of the body.

Colonel Montagu remarks, "This curious species inhabits the thoracic plate of *Callianassa subterranea*, concealing itself between the fleshy part and the shell, and forming a tumour on one side. From this situation I have extracted it alive, and have kept it in that state for several days in a glass of sea-water." In the few specimens observed by

Montagu, they were always attended by the male, who attaches himself firmly by his claws to the appendages. He adds that the very disproportionate size of the sexes is wisely adapted to an animal whose habitation is so confined.

FAM. BOPYRIDÆ.

Abdominal appendages lamellar and concealed beneath the abdomen.

Gen. 134. BOPYRUS, *Latr.*

Male much smaller than the female, narrow and elongated; head with rudimentary antennæ; legs very short; the abdominal segments with false legs, like small membranous lobes, scarcely perceptible. Female five or six times larger than the male; body pyriform and very depressed, and always more or less bulging on one side; her abdomen is very wide at the base, and gradually contracts to a point, its lower surface has five pairs of false legs, each consisting of a single membranous triangular plate.

Found beneath the carapace of Prawns of the genera *Palæmon* and *Hippolyte*, their presence being indicated by an external swelling of that part. The French fishermen

at one time believed these curious parasites to be young soles.

BOPYRUS SQUILLARUM, Latr. *Shrimp-fixer*.—Antennæ of the male completely concealed beneath the front of the head. Body of the female somewhat elongated. Colour pale greenish, above glossy; abdominal membranes dark at their edges.

Common on the carapace of the Shrimp, which is disfigured by the lodgment of this animal distorting the shell. This tumour forms a secure asylum for the protection of the soft membranous bodies of these parasites. Colonel Montagu remarks that the dissimilarity in the sides of the *Bopyrus* is occasioned by the unequal pressure they receive from the carapace of the Shrimp; this growth is therefore not constantly alike, but depends on the side of the carapace tenanted by each individual.

BOPYRUS HIPPOLYTES, Kroyer.—Antennæ of the male projecting in front of the head; body of the female oval.

The late Mr. Thompson of Belfast found this on the *Hippolyte varians*, taken on the coast of Galway.

Gen. 135. PHRYXUS, *Rathke*.*

Antennæ four, short, slender. Eyes (of the male) small. Back of the female flat, of the male convex; abdomen of the female convex, of the male flat; legs of the female inclined towards the back, those of the male formed for walking. Branchiæ of the female large, two-lobed; those of the male rudimentary.

PHRYXUS HIPPOLYTES, Rathke.—Female with scarcely any legs on one side of the body; the lobes of the branchiæ larger and somewhat oblong; the tail of the male produced into a short blunt point.

Found on a species of *Hippolyte*, and also on the White Shrimp on the coast of Sussex (Bond. Proc. Ent. Soc. April, 1846). Another species of *Phryxus* is found on the *Pagurus Bernhardus* on the Norwegian coast; it is described and figured by Rathke. This species is most probably also a native of our seas.

* Nov. Act. Acad. Nat. Cur. xx. p. 40.

DIVISION ENTOMOSTRACA.*

Aquatic Crustacea covered with a shell of a horny or leathery substance, formed of one or more pieces, in some resembling a bivalve shell, in others a buckler which either entirely or in part envelopes the body and the limbs of the animal; branchiæ attached to the feet or jaws; feet jointed and fringed with hairs. They undergo a regular moulting or change of shell, in some amounting to a species of transformation.

LEGION BRANCHIOPODA.

Mouth with organs adapted for mastication; branchiæ many, attached to the feet; body sometimes naked, but most usually with a buckler-like envelope, in some enclosing only the head and thorax, in others the whole body; feet all bearing branchiæ; antennæ two or four, jointed, and generally ciliated; eyes sometimes two or three, but often only one, or so close to each other as to appear single. The species are all free, swimming at large in the water.

* *Εντομος*, an insect; *οστρακον*, a shell.

ORDER I. *PHYLLOPODA*.*

Body naked, or with only the head and thorax covered by the carapace; feet many, from eleven pairs to sixty; joints foliaceous and gill-like, chiefly fitted for respiration; eyes two or three, in some placed at the end of movable pedicels; antennæ one or two pairs, generally small, and not assisting the animal in swimming; mandibles generally without palpi.

FAM. *APODIDÆ*, *Baird*.

One pair of antennæ, short and styliform; eyes two, sessile; young only with one eye; feet sixty pairs, all branchial; nearly the whole body covered by a large shield-shaped carapace; body formed of numerous rings.

Dr. Baird observes, "The number of articulations or separate pieces of which the body of these animals is composed, is extraordinary. Schæffer, with wonderful patience, undertook the task of counting them, and in a table, in which he enumerates them *seriatim*, reckons the number to be 1,802,604; and Latreille says that we may safely take them to be not less than two millions" (Brit. Ent. p. 25).

* Φυλλον, a leaf, and πους, ποδος, a foot.

The *Apus* swims on its back as easily as on its lower surface, using the feet, which are constantly in motion. Its food seems to be chiefly the smaller kinds of *Entomostraca*, the shells of which they can readily break with their mandibles. Their eggs retain their vitality for a great while; as the little creatures have been known to appear in a ditch that was suddenly filled with water after having been dried up for two or three years.

Gen. 136. APUS, *Scopoli*.

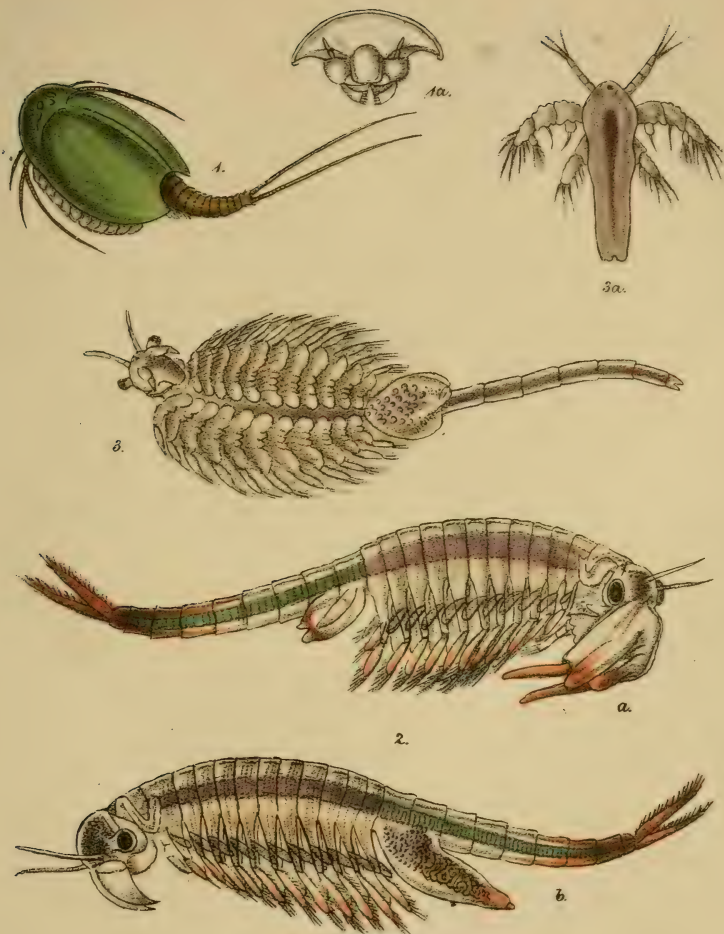
Plate XV. fig. 1 *a*, shows the head viewed in front.

APUS CANCRIFORMIS, Schæffer. *Shield-Shrimp*. (Plate XV. fig. 1.)—Brownish-yellow, clouded with darker colour; shield covering more than half the body, ovate.

Hab. Pond on Bexley Common. Devonshire, Bristol. (Baird, 1. c. p. 31.)

FAM. NEBALIADÆ, *Leach*.

Antennæ two pairs, large and branched; eyes two, pedunculated; twelve pairs of feet, eight for breathing, and four for swimming. Carapace large, enclosing the head, thorax, and part of the abdomen, as if in a bivalve shell.



Savory del. et lith.

Vincent Brooks Imp.

1 *Apus cancriformis* 2 *Chirocephalus diaphanus*, a, male, b female
 3 *Artemia salina* & larva.

Montagu describes the upper pair of antennæ, when the *Nebalia* moves, to be in constant motion, as well as the abdominal feet, while the lower pair are usually motionless and brought under the body.

Gen. 137. NEBALIA, *Leach*.

NEBALIA BIPES, O. Fabr. sp.—Body ovate, of a pale-yellow colour; lower antennæ as long as the body.

Length three-eighths of an inch.

Hab. Devonshire, west coast of Ireland, Shetland Islands. (Baird, l. c. p. 38.)

Otho Fabricius says that the female carries her eggs beneath the thorax during the whole winter; these begin to hatch in April, and appear in May, when they are very lively, and adhere to the mother. The adult is not very active. On our coast they are found under stones, lying on mud amongst hollows of rocks.

FAM. BRANCHIPODIDÆ, *Baird*.

The body without carapace; two pairs of antennæ, the lower in the male prehensile; the eyes two, on peduncles (in the young there is but one eye); eleven pairs of feet, all

branchial, that is, formed for breathing with. The animals of this family swim on their backs. Dr. Baird records seventeen species from various parts of the world in his monograph of the family ('Proceedings of the Zoological Society for 1852').

Gen. 138. CHIROCEPHALUS,* *Prevost.*

Abdomen large, of nine segments, and ending in a tail formed of two well-developed plates; lower antennæ in the male cylindrical, and furnished at the base with fan-shaped and digitiform appendages.

CHIROCEPHALUS DIAPHANUS, *Prevost. Fairy Shrimp.* (Plate XV. fig. 2.)—An inch and more long when adult, and nearly quite transparent. Tail bright red; the large basal joint of the antennæ of a transparent bluish-green tipped with red; the back of the female is blue. (Fig. *a* is the male, fig. *b* the female.)

Hab. Pools on Blackheath, Epping, Brighton, Hammer-smith, Bristol; Devon, near Chudleigh.

Dr. Baird says that this species is found in stagnant water, very often in the ditches and deep cart-ruts on the edges of woods and plantations. He states that the only

* Χειρ, a hand, and κεφαλη, a head.

place near London where he has met with it, is on Blackheath. "They swim upon their back, and in fine warm weather, when the sun is not too strong, they may be seen balancing themselves, as it were, near the surface by means of their branchial feet, which are in constant motion. On the least disturbance, however, they strike the water rapidly with their tail from right to left, and dart away like a fish, and hasten to conceal themselves by diving into the soft mud, or amongst the weeds at the bottom of the pool. It is certainly the most beautiful and elegant of all the *Entomostraca*. The male is especially beautiful. The uninterrupted undulatory wavy motion of its graceful branchial feet, slightly tinged as they are with a light reddish hue, the brilliant mixture of transparent bluish-green and bright red of its prehensile antennæ, and its bright red tail, with the beautifully plumose setæ springing from it, render it really exceedingly attractive to the view. The undulatory motion of its branchial feet serves another purpose in addition to that of keeping the animal suspended in the water. The thorax or body of the animal has been described, when floating on its back, as like the cavity of a little boat, the feet representing the oars. When these are in motion, they cause the water contained in this cavity to be compressed,

and to mount up as along a canal, carrying in the current the particles destined for its food towards the mouth. It seems to be constantly, when in this position, employed in swallowing and digesting its food, its masticatory organs being in perpetual motion.”*

The Fairy Shrimp seems to live on dead animal or vegetable matter.

Dr. Shaw, who has given a history of it,† tells us that the females deposit their eggs in March and April, without any settled order, and perfectly loose in the water. They appear to the naked eye like very minute globules, “scarce, if at all, exceeding in size the particles of the farina in a mallow; and what makes this comparison the more just is, that each ovum, when magnified, is extremely like one of the globules of farina in that plant, for it is thickly beset on every side with sharp spines.” These, Dr. Shaw supposes, may probably be intended to assist in causing them to adhere to the substances on which they fall when extruded, as well as defend them from the smaller water-insects.

* Baird, Brit. Entomostraca, pp. 47, 48.

† Linnean Transactions, vol. i. pp. 103, 110.

Gen. 139. ARTEMIA, *Leach*.

Abdomen long, formed of six divisions, shortly bilobed, and not divided into two caudal plates; the lower antennæ of male flat, broad, and not furnished with any appendages.

ARTEMIA SALINA, Linn. sp. *Brine Shrimp*. (Plate XV. fig. 3 *a*, larva.)—Body linear, nearly half an inch long.

Hab. Salt pans at Lymington, Hants.

From Dr. Baird's work we make the following extract on the habits of the *Artemia salina*. "They are found exclusively in salt-water, and though they do occur in salt-marshes, still they are to be found in greatest abundance in water that is very highly charged with salt. 'Myriads of these animalcula,' says Mr. Rackett, 'are to be found in the salterns at Lymington, in the open tanks or reservoirs where the brine is deposited previous to the boiling. It attains the desired strength by evaporation, from exposure to the sun and air, in about a fortnight; a pint contains about a quarter of a pound of salt; and this concentrated solution instantly destroys most other marine animals.' In these reservoirs there is always a certain quantity of this strong brine allowed to remain, and there these little creatures are found in greatest abundance and in greatest

enjoyment ; whilst in what are called the sun-pans, where the brine is made by the admission of sea-water during the summer, and which are emptied every fortnight, they are never found at all. During the fine days in summer they may be observed in immense numbers near the surface of the water, and as they are frequently of a lively red colour, the water appears to be tinged with the same hue. ‘There is nothing more elegant,’ says Mr. Joly, ‘than the form of this little Crustacean ; nothing more graceful than its movements. It swims almost always on its back, and by means of its fins and tail it runs in all directions through the element it inhabits. It may be seen to mount, descend, turn over, spring forward, curve its body into the form of an arch and then rebound, and deliver itself up to a thousand bizarre and capricious gambols. Their feet are in constant motion, and their undulations have a softness difficult to describe.’ The tanks or reservoirs are called clearers, as the liquor becomes clear while in them, and this effect is attributed by the workmen to this constant and rapid motion of their feet. ‘So strongly persuaded,’ says Mr. Rackett, ‘are the workmen of this fact, that they are accustomed to transport a few of the worms from another saltern, if they do not appear at their own.’” *

* Baird, Brit. Entomostraca, p. 58.

ORDER *CLADOCERA*.*

Body, except head, which projects, quite enclosed in two shells, joined on the back. Feet four to six pairs; joints partly cylindrical, and partly foliaceous and branchiform. Eye single, and very large. Two pairs of antennæ; the lower branched, large, and used in swimming. Mandibles without palpi.

FAM. *DAPHNIADÆ*, *Baird*.

Upper antennæ generally very small; lower large, generally two-branched. Five or six pairs of feet, enclosed within the shell. Intestine straight.

Feet in constant motion, and giving an undulatory motion to the water, and establishing a current towards the mouth. Dr. Baird informs us that the various species of this family are only to be met with in fresh-water, generally in ponds and ditches, some preferring those in which there is much duckweed (*Lemna*) floating on the surface; others delighting in horseponds where cattle come to drink. They are often found in myriads; and as some of the species

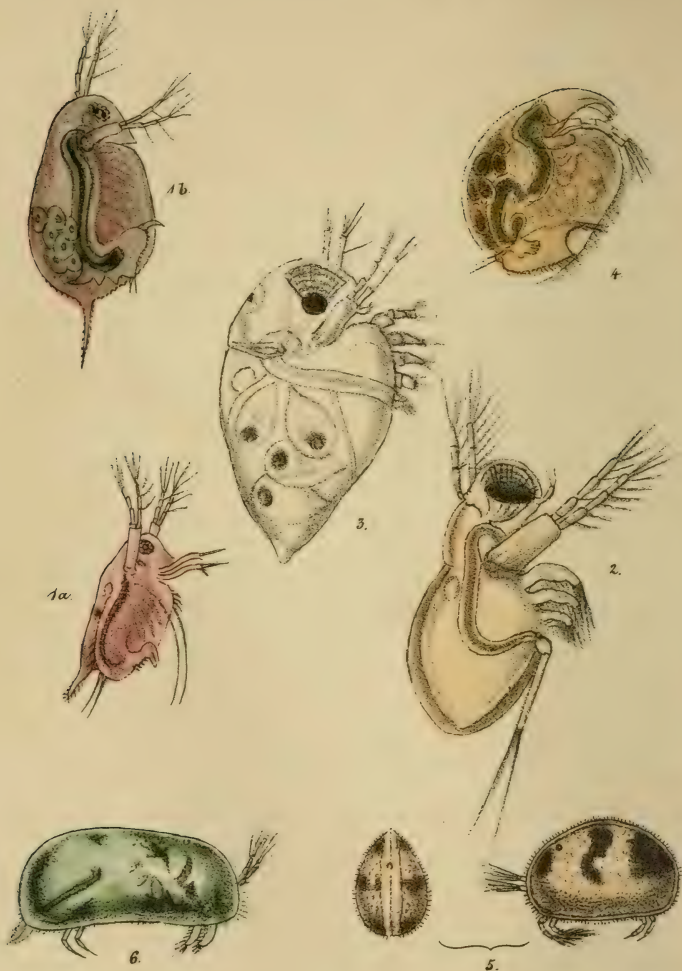
* *Κλαδος*, a branch, and *κερας*, a horn; from their branched antennæ.

assume a red colour, it has been said that they have communicated a bloody hue to water. Dr. Baird has observed large patches of water of a ruddy hue, and ascertained the cause to be an immense number of the *Daphnia pulex*; "the myriads necessary to produce this effect are really astonishing, and it is extremely interesting to watch their motions. On a sunshiny day, in a large pond, a streak of red, a foot broad, and ten or twelve yards in length, will suddenly appear in a particular spot, and this belt may be seen rapidly changing its position, and in a very short time wheel completely round the pond. Should the mass come near enough the edge to allow the shadow of the observer to fall upon them, or should a dark cloud suddenly obscure the sun, the whole body immediately disappears, rising to the surface again when they have reached beyond the shadow, or as soon as the cloud has passed over. They are very prolific."*

Subfamily DAPHNINA.

Furnished with five pairs of feet; lower antennæ two-branched; one branch divided into four, the other into three joints.

* Baird, Brit. Entomostraca, p. 78.



Sowerby del et lith.

Vincent Brooks Imp.

1 *Daphnia pulex*, a, male, b, fem. 2. *Polyphemus pediculus*. 3. *Evadne Nordmanni*. 4. *Eurycerus lamellatus*, 5. *Cypris vidua*. 6. *Candona reptans*.

Gen. 140. DAPHNIA, *Müller*.

Head produced downwards into a more or less prominent beak. Upper antennæ exceedingly small, one-jointed, and situated under the beak ; lower antennæ large and powerful. The largest British species is not above $\frac{1}{5}$ of an inch long.

DAPHNIA PULEX, Linn. sp. *Branched Water-flea*. (Plate XVI. fig. 1.)—Carapace oval, transparent, dorsal margin smooth ; lower extremity of the valves ending in a sharp spine serrated on the edges.

Hab. Pools and ditches of standing water. Common from April to January.

DAPHNIA PSITTACEA, Baird.—Carapace oval, transparent ; head large, squarish, front part beaked like the beak of a parrot ; dorsal margin of the carapace serrated.

Hab. Pond on Blackheath (Dr. Baird).

DAPHNIA SCHÆFFERI, Baird.—Carapace nearly circular, surface finely reticulated ; head small. The largest British species.

Hab. Ponds, Bexley Heath, Kent ; and ponds, Norwood Green, Surrey.

Dr. Baird describes the motion of this species through the water as being peculiar ; it is a tumbling, heavy sort

of movement. In a vessel in which he kept some, he frequently saw them turn head-over-heels, throwing a regular summersault ten or a dozen times in succession.

DAPHNIA VETULA, Müller, p.; Baird.—Carapace ovate, small, transparent; striated hinder extremity without spine; head blunt, small, beak not very prominent.

Hab. Ponds and ditches, in summer and autumn.

DAPHNIA RETICULATA, Jurine, sp.—Carapace rounded-oval, slightly greenish, surface covered with a complete mesh-work of small hexagonal cells; lower extremity with a short spine; head rather small, without beak; sixth segment of body with a spur.

Hab. Ponds and ditches, in summer and autumn.

DAPHNIA ROTUNDA, Strauss.—Carapace almost quite round, lower extremity with a short blunt spine; colour reddish; sixth segment of body without a spur.

Hab. Ponds and ditches near London.

DAPHNIA MUCRONATA, Müller.—Carapace with its front edge quite straight, and ending below in a spine of some length; the whole creature is of a dark gray.

Hab. Ponds about Isleworth. Dr. Baird found two varieties there; one has the head rounded above, the other has the head ending in a sharp point directed upwards.

DAPHNIA JARDINII, Baird.—A small species, described in 1857 by Dr. Baird ; it has the head produced into a sort of spine, while the carapace terminates posteriorly in a long spine.

Galloway fresh-water loch (Sir W. Jardine). This species forms part of the food of the trout.

Gen. 141. *MOINA*, Baird.

Head rounded and blunt ; upper antennæ of some length, one-jointed, rising from the front of the head, near the centre ; lower antennæ very large and fleshy at the base.

MOINA RECTIROSTRIS, Müller, sp.—Carapace oval, transparent, rounded at the back, and ciliated along the fore-margin.

Hab. Pond on Blackheath.

MOINA BRACHIATA, Jurine, sp.—Carapace olive-colour, bulging very much behind. Abdomen at the end, with eight short spines, and two long stout claws.

Hab. Pond on Blackheath. Dr. Baird found this species first in a stagnant pool nearly opposite old St. Pancras Church, in 1844 ; the ground was shortly afterwards built on.

Gen. 142. MACROTHRIX, *Baird*.

Upper antennæ flat and one-jointed, pendulous from the beak ; filament from end of first joint of front branch of lower antennæ much longer than any of the others ; * eye accompanied with a black spot.

MACROTHRIX LATICORNIS, Jurine, sp.—Carapace oval, transparent, colourless, smooth.

Hab. Ponds at Southall and Highgate, Middlesex ; Belfast.

Near this, and probably only a rosy-coloured variety of it, is a species which has been named *M. roseus*. It has been found abundantly in Lochmaben Loch, in Dumfriesshire, where it forms great part of the food of the fish called the Vendace. Dr. Baird says it swims horizontally, and that the motions of its arms, as it bounds through the water, are soft and graceful.

Gen. 143. BOSMINA, *Baird*.

Upper antennæ long, curved, cylindrical, consisting of

* Hence the name Dr. Baird has given it, from μακρος, long, and θριξ, a hair.

many small joints, and projecting from the end of the beak ; lower antennæ small.

The most common British species of this genus has been found abundantly in the common drinking-water of London, supplied from the New River and Highgate ponds (Dr. Baird).

BOSMINA LONGIROSTRIS, Müller, sp.—Animal very small ; carapace rounded behind, bulging in front, and terminating below in a sharp point. Dr. Baird tells us that the motion of this curious little creature through the water is caused by numerous and very rapid strokes of its lower antennæ.

BOSMINA COREGONI, Baird.*—Double the size of the preceding ; carapace rounded below ; antennæ fully longer than the whole body.

Lochmaben Castle Loch (Sir W. Jardine, Bart.).

The food of the Vendace.

Subfamily SIDINA, *Baird*.

Furnished with six pairs of feet ; upper antennæ of moderate size ; lower antennæ two-branched, a row of spinous filaments springing from the edge of the larger branch.

* A new species, lately described by Dr. Baird.

Gen. 144. SIDA, *Strauss*.

One branch of lower antennæ with three joints, the other with two joints.

SIDA CRYSTALLINA, *Strauss*.—Carapace elongate-oval, very transparent, truncated at the lower end.

Hab. Ponds in Northamptonshire and Surrey, and near Dublin and Killarney, but not very common.

Dr. Baird describes its motion through the water as being a sort of rapid running movement. He says the animals "are generally inactive, and adhere in a peculiar manner by the back of their head to the side of the vessel in which they are contained, remaining there for hours."

Gen. 145. DAPHNELLA, *Baird*.

Lower antennæ very large, both branches formed only of two joints.

DAPHNELLA WINGII, *Baird*.—Carapace elongated, and of a beautiful clear crystalline transparency.

Hab. Ponds between Twickenham and Whitton, Middlesex, and ditch near Richmond, opposite Isleworth. This species was named by Dr. Baird in honour of the late Mr.

William Wing, an admirable draughtsman of Insects and Crustacea, and an assiduous student of Natural History in general.*

FAM. II. *POLYPHEMIDÆ*.

Four pairs of feet, not included in the carapace. Eye very large. Lower antennæ two-branched, one branch with four joints, the other with three. Lower part of carapace having a large empty space for the ova and young.

Gen. 146. *POLYPHEMUS*, Müller.

Head distinct from the body. Abdomen long, projecting externally from the shell. The eye is so large in the adult that it seems to occupy the whole head.

POLYPHEMUS PEDICULUS, Linn., sp. (Plate XVI. fig. 2.)
—Body oval, separated from the head by a deep notch.

Hab. Ditch near Richmond, opposite Isleworth. Dr. Baird observes that it always swims on its back, and generally horizontally, with quick repeated motions of the antennæ and legs, which carry it rapidly through the water.

* The genus *Diaphanosoma* of S. Fischer is synonymous with the above, and perhaps the species (*D. Brandtii*).

Gen. 147. EVADNE, *Loven*.

Head not distinct from the body; abdomen short, scarcely projecting from the shell.

EVADNE NORDMANNI, Loven. (Plate XVI. fig. 3.)—Nearly colourless, except the back part of the eye, which is black.

Hab. Firth of Forth. The late Mr. Goodsir, who perished in the Arctic regions, on the unfortunate Franklin expedition, first found this species in the British seas. It is very active, and forms part of the food of the herring. The specific name was given to it in compliment to Professor Nordmann of Helsingfors, an able writer on parasitic Crustacea and other classes of animals.

FAM. III. LYNCEIDÆ.

Two pairs of antennæ; upper very short; lower of moderate size, branched, each branch divided into three joints. Five pairs of legs. Eye single, but with a black spot in front of it. Abdomen jointed. Dr. Baird informs us that Jurine, by isolating the young successively, obtained *fifteen* generations of one of the species of this family, *Chydorus sphaericus*. The various species swim rapidly, directing themselves by a

rapid motion of their lower antennæ and legs. Their food consists of both animal and vegetable matter.

Gen. 148. EURYCERCUS, *Baird*.*

Subquadrangular. Abdomen very broad, formed like a flat plate, densely serrated. Beak blunt, slightly curved downwards.

EURYCERCUS LAMELLATUS, Müller, sp. (Plate XVI. fig. 4.)
—Largest of the family; carapace olive-coloured, ciliated on the front margin.

Hab. Ponds and ditches in summer.

Gen. 149. CHYDORUS, *Leach*.

Nearly spherical. Beak very long, sharp, curved downwards. Lower antennæ very short.

CHYDORUS SPHERICUS, Müller, sp.—Shell round, smooth, olive-green.

Hab. Ponds and ditches during all the year.

Pritchard says that the young of this species play near the parent and swim towards her for protection; she encloses them within her shell.

* *Eurus*, wide, and *κερκος*, a tail.

CHYDORUS GLOBOSUS, Baird.—Shell quite globular, six times larger than in *C. sphaericus*, spotted with black.

Hab. Ponds in the vicinity of London.

Gen. 150. CAMPTOCERCUS, *Baird*.*

Oval; abdomen very long, slender, and very flexible, much serrated. Beak blunt, slightly curved downwards.

CAMPTOCERCUS MACROURUS, Müller, sp.—Shell pellucid, whitish; abdomen very long and slender. The animal, Dr. Baird tells us, can twist its abdomen completely round in a circle, and then, unbending it, thrust it far out beyond the shell.

Hab. Highgate ponds, and other places near London.

Gen. 151. ACROPERUS, *Baird*.

Shell rounded behind, somewhat harp-shaped, terminating in an obtuse point projecting forwards. Lower antennæ long. Beak blunt, curved downwards.

ACROPERUS HARPÆ, Baird.—Shell strongly ribbed, somewhat obliquely, giving the shell some resemblance to a harp.

* Καμπτος, flexible, and κερκος, a tail.

Hab. Ponds and ditches in Scotland and England.

ACROPERUS NANUS, Baird.—Not a seventh part the size of the preceding.

Hab. Pond at Norwood Green, and near Southall, Middlesex.

Gen. 152. ALONA, *Baird*.

Shell quadrangular, striated longitudinally. Lower antennæ short. Beak blunt and nearly erect.

ALONA QUADRANGULARIS, Müller, sp.—Shell transparent, deep-brown.

Hab. Ponds and ditches.

ALONA RETICULATA, Baird.—A very small species, with a closely reticulated shell. Found by Dr. Baird in a pond near Southall.

ALONA OVATA, Baird.—Ovate, transparent, larger than *A. quadrangularis*.

Hab. Pond on Blackheath.

Gen. 153. PLEUROXUS, *Baird*.*

Front margin prominent on upper part; lower part trun-

* Πλευρον, a side, and οξυς, sharp.

cated, or cut sharp and straight. First pair of feet very large. Beak sharp, curved downwards.

PLEUROXUS TRIGONELLUS, Müller, sp.—Shell somewhat triangular, transparent. Beak curved downwards.

Hab. Ponds in England and Scotland.

PLEUROXUS UNCINATUS, Baird.—Shell somewhat triangular, fluted. Beak curved upwards.

Hab. Pond between Hanwell and Southall.

PLEUROXUS HAMATUS, Baird.—Much smaller than either of the preceding, and very transparent.

Hab. Yetholm Loch. Dr. Baird says this may prove to be the male of the first species.

Gen. 154. PERACANTHA, *Baird*.

Oval; lower extremity of the shell somewhat curved backwards and along with the upper end of the front margin, beset with strong hooked spines. Beak sharp, curved downwards.

PERACANTHA TRUNCATA, Müller, sp.—Shell nearly oval, and longitudinally striated.

Hab. Ponds and ditches.

LEGION LOPHYROPODA.*

Mouth furnished with organs fitted for mastication. Branchiæ few, attached to the organs of the mouth. Body with an envelope, either shaped like a shield, enclosing head and thorax, or shaped like a bivalve shell, enclosing the animal. Feet not exceeding five pairs; joints more or less cylindrical and fitted for locomotion. Eye one. Two pairs of antennæ, one pair used in locomotion.

ORDER *OSTRACODA*.†

Body enclosed in a two-valved covering, like a bivalve shell. Hind jaws bearing branchiæ. No external ovary. Feet, two and three pairs, adapted for progressive motion.

FAM. *CYPRIDÆ*.

Two pairs of antennæ; upper long, with numerous joints and a pencil of long filaments; lower stout, and like feet. Eye single. Feet two pairs.

Dr. Baird thus describes the shell of these curious animals: "The substance of these valves is compact and very

* *Λοφύρος*, with stiff hairs, and *πους*, a foot.

† *Οστράκον*, a shell; from the animal being enclosed in a covering like a bivalve shell.

brittle, and seems to be endued externally with a species of varnish, to protect them from the action of the water; as whenever they rise to the surface, the shell becomes perfectly dry, and floats there in spite of the animal's struggles again to immerse itself."

The *Cypridæ* are found in stagnant water, living on dead animal matter and confervæ. They deposit spherical eggs upon plants, fixing themselves when so engaged so firmly that no agitation of the water displaces them; the eggs are hatched in a few days. Before they acquire the adult state, they undergo several moultings. Dr. Baird says, "The renewing of the shell forms a fine example of the process of exuviation; the change which takes place being most complete, for not only does the shell itself fall off, but the animal even casts off the internal parts of the body, the fine pectiniform branchiæ, and the minutest hairs clothing the setæ of the antennæ," etc. He informs us that when the ponds in which they live dry up in summer, they bury themselves in the mud, and are thus often preserved in the moisture until the fall of rain again fills their habitations. The eggs, even when the mud in which they are placed is dry and hard, do not lose their vitality. The *Cypridæ* are very lively and active.

Gen. 155. CYPRIS, *Müller*.

Lower or feet-like antennæ furnished with a pencil of long hairs. Animal swims freely in the water.

CYPRIS TRISTRIATA, Baird.—Shell oval, somewhat kidney-shaped, hind part with three narrow bands or streaks. Shell in front deep-green, behind paler-green.

Hab. Near London, and in Berwickshire.

CYPRIS VIDUA, Müller. (Plate XVI. fig. 5.)—Shell oval, dull white, with three waved black fasciæ; shell all round furnished with fine, short hairs.

Hab. Near London, etc.

CYPRIS MONACHA, Müller.—Shell rhomboidal, surface reticulated, upper part white, lower part dark, shaded with a yellow-green.

Hab. Near London, etc.

CYPRIS FUSCA, Strauss.—Shell oval, brown, covered with fine hairs.

Hab. Near London, Hampstead, etc.

CYPRIS COMPRESSA, Baird.—Shell rounded, compressed, brownish-grey at each end, with fine hairs, surface dotted.

Hab. Yetholm, and near London.

CYPRIS OVUM, Jurine, sp.—Shell oval, light-brown tinged

with green ; valves smooth and beset all round with fine hairs.

Hab. Yetholm, and near London, in ponds and streams.

CYPRIS JOANNA, Baird.—Shell rounded, ovate, brown, with an orange mark across the back of the shell, covered with minute black dots, and beset all round with stiff hairs.

Hab. Pool near Abbey St. Bathans, among the Lammermuir Hills.

CYPRIS ELONGATA, Baird.—Shell wedge-shaped, white, transparent, hairy, hind part narrow and considerably elongated.

Hab. Yetholm.

CYPRIS WESTWOODII, Baird.—Shell kidney-shaped, elevated, green ; valves covered over with long hairs.

Hab. Yetholm.

CYPRIS GIBBOSA, Baird.—Shell ovate and elevated, the centre with a large hump ; valves light-green, with short fine hairs.

Hab. Near London.

CYPRIS CLAVATA, Baird.—Shell oblong, flattened in front ; valves light-grey, with a dark-coloured ray running from the centre towards the hind extremity, which is marked with an orange-coloured spot.

Hab. Near London.

CYPRIS STRIGATA, Müller.—Shell subovate, glabrous, margins ciliated; valves brown, with three white fasciæ.

Hab. East Lothian.

CYPRIS ELLIPTICA, Baird.—Shell nearly elliptical, light-green, clouded with darker patches on the sides of the shell.

Hab. Highgate.

CYPRIS SELLA, Baird.—Shell ovate, globose, of a light-green all over, the back and side marked with a patch of darker hue.

Hab. Clapham (pond on the Common).

CYPRIS AURANTIA, Jurine, sp.—Shell oval, finely polished, orange, posterior half with an oblique, broad, lighter band.

Hab. Blackheath, Windsor, Dover.

CYPRIS CUNEATA.*—Carapace valves wedge-shaped; whole carapace of a deep-green colour, and covered with fine hairs.

Hab. Duddingston Loch, near Edinburgh.

CYPRIS GIBBA, Ramdohr.—Carapace oblong, compressed; valves marked across the middle by two unequal parallel furrows, situated side by side; of a dull-yellowish colour.

Hab. Fresh-water ponds and rivers. First detected as British by Mr. T. Rupert Jones, who remarks ('The Ento-

* A species published by Dr. Baird, in the Pro. of the Zool. Soc. for 1850.

mostraca of the Tertiary Formation,' p. 15), that it is a common species, but has escaped observation to some extent, as it has the habit of remaining on or in the mud, rather than swimming in the water and crawling on the weeds. In this love of the mud, and habit of crawling, it very much resembles the species of the next genus.

Gen. 156. CANDONA, *Baird*.

Like *Cypris*, but the lower antennæ have not the pencil of long hairs or filaments. The animal creeps at the bottom or upon aquatic plants, instead of swimming freely through the water.

CANDONA LUCENS, Baird.—Shell somewhat kidney-shaped; valves pure white, pearly, nearly opaque.

Hab. Near London, etc.

CANDONA REPTANS, Baird. (Plate XVI. fig. 6.)—Shell ovate-elliptical; valves very pale green, variegated on the front and hind margins.

Hab. Near London, etc.

One of the largest of the bivalve *Entomostraca* found in our fresh-water. Mr. Rupert Jones finds it abundantly in a fossil state, in peat deposits and in fresh-water marl.

CANDONA HISPIDA, Baird.—Shell oval, uniform brown; valves very rough; surface covered with spines.

Hab. Near London, and Yetholm.

CANDONA DETECTA, Müller, sp.—Shell oblong, oval, valves flattened, pellucid, quite smooth, anterior part rather narrower than posterior; colour dull-white.

Hab. Near London, etc.

CANDONA SIMILIS, Baird.—Shell elliptical, flat, narrower behind than in front; white, with two orange spots on back.

Hab. Clapham Common. Dr. Baird observes that the motion of this species is very deliberate; when it creeps along the plants, it first puts one foot forward and then leisurely draws up the other.

CANDONA LACTEA.^{*}—Valves of the carapace oblong, ovate, the surface smooth and shining, and of a dull size.

Hab. Charing, Kent; and Regent's Park.

A very small species.

CYPRIDEIS TOROSA, Rupert Jones. ('Entomostraca of the Tertiary Formation,' p. 21, pl. ii. fig. 1; and woodcut, p. 16, fig. 2.)—Found in the pleistocene sands of Essex;

* A species described by Dr. Baird, in the Proc. Zool. Soc. subsequently to the publication of his work.

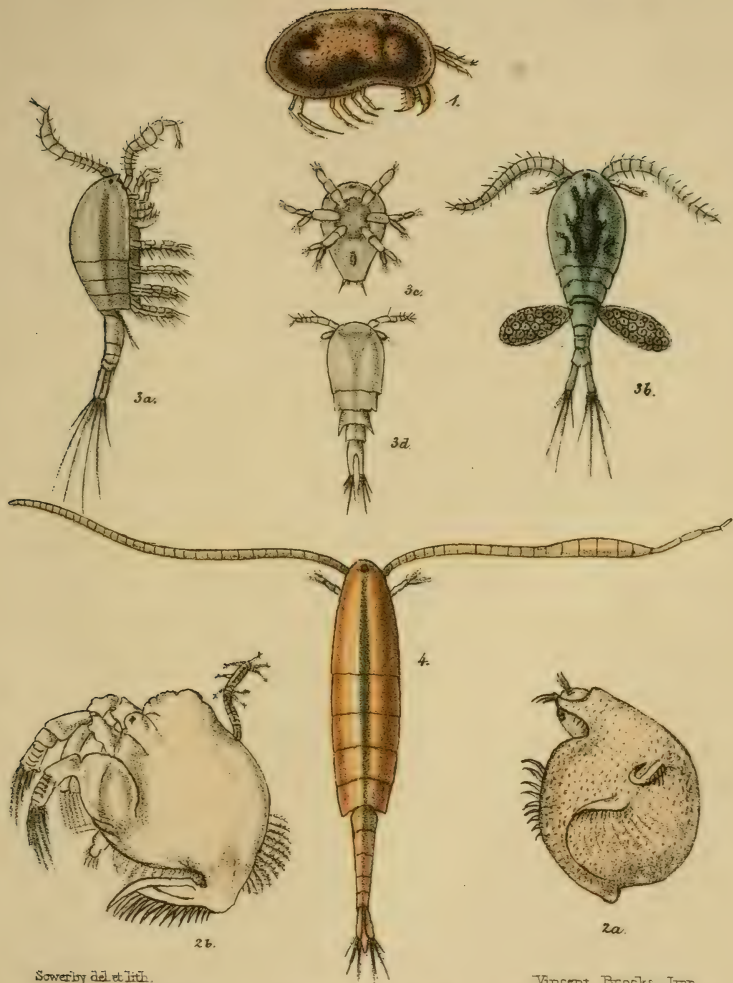
occurs as a recent species living in the Gravesend ditches, where Mr. Pickering "found it in great numbers, attached to the cases of caddis-worms, in a ditch which runs on the land side of the Thames bank, between Gravesend town and Coal-house Point, near an old mill; the water flowing into, and not from the Thames, except at high tides."

FAM. CYTHERIDÆ.

Two pairs of antennæ, the upper not furnished with the pencil of long filaments. Feet three pairs.

Gen. 157. CYTHERE, *Müller*.

Feet not enclosed in the shell, three pairs; abdomen short. One eye. Carapace valves in front and behind, usually ornamented with a marginal series of fine spines. It is chiefly in sea-water that the species of this genus are to be found, especially in the little pools among rocks on the sea-shore. Dr. Baird observes, "They live among the fuci and confervæ, etc. which are to be found in such pools; and the naturalist may especially find them in abundance in those beautiful, clear, little round wells which are so frequently to be met with, hollowed out of the rocks of the sea-shore,



Sowerby del. et lith.

Vincent Brooks Imp.

1. *Cythere albocarinata*. 2. *Gypridina Macandrei*. a, shell, b, animal 3. *Cydops quadricornis*, a, male, b, female, c, d, larvæ. 4. *Diaptomus Castor*.

which are within reach of the tide, and the water of which is kept sweet and wholesome by being thus changed twice during every twenty-four hours. In such delightful pools, clear as crystal, when left undisturbed by the receding tide, these interesting animals may be found, often in great numbers, sporting about amongst the confervæ and corallines which so elegantly and fancifully fringe their edges and decorate their sides, and which form such a glorious sub-aqueous forest for myriads of living creatures to disport themselves in. Sheltered amongst the ‘umbrageous multitudes’ of stems and branches, and nestling in security in their forest glades, they are safe from the ravages of the advancing tide, though lashed up to fury by the opposing rocks which for a moment check its advance ; and weak and powerless though such pigmies seem to be, they are yet found as numerous and active in their little wells, after the shores have been desolated by the mighty force of the tide which has been driven in in thunder by the power of a fierce tempest, as when the waves have rolled gently and calmly to the shore in their sweetest murmurs.”* The various species have never been observed to swim ; they walk among the branches.

CYTHERE FLAVIDA, Müller.—Shell oblong, narrow, smooth,

* British Entomostraca, p. 167.

of a pale yellow horn-colour, transparent; front extremity sharper than the posterior.

Hab. Cockburnspath, and in sand from Torquay. And also, according to Mr. Jones, abundant as a fossil in the Crag of Suffolk.*

CY THERE RENIFORMIS, Baird.—Shell kidney-shaped, rough with hairs, both ends nearly equal in size; centre of valves covered with a calcareous-looking crust.

Hab. Berwickshire, and North Foreland, near Dover.

CY THERE ALBO-MACULATA, Baird. (Plate XVII. fig. 1.)—Shell oblong, both ends and the lower margin densely hairy; dull-brown, covered with short spines, except where marked with two white, smooth, shining spots.

Hab. Berwick Bay, and near Dover.

CY THERE ALBA, Baird.—Shell obovate, broadest in front; white, the margin purer white than the rest of the shell.

Hab. Sea-shore at Dunbar.

CY THERE VARIABILIS, Baird.—Shell oval, narrower in front, varying in colour and marking from fine flesh-colour to dark-brown, and often marked with streaks.

Hab. Coast of Berwickshire, Dover.

CY THERE AURANTIA, Baird.—Shell somewhat kidney-

* The Entomostraca of the Tertiary Formation, p. 51.

shaped; valves smooth, glaucous, bright-orange. A very minute species.

Hab. Berwick Bay.

CYTHERE NIGRESCENS, Baird.—Shell gibbously ovate, hinder end with a sharp point; valves smooth, of a dirty-black colour.

Hab. British coasts.

CYTHERE MINNA, Baird.—Shell elongate-ovate, pointed behind; valves white. The largest British species met with by Dr. Baird.

Hab. Deep water near Shetland, where it was dredged by Mr. M'Andrew.

CYTHERE INOPINATA, Baird.—Shell oblong, ovate, white, with a slight orange-coloured mark on upper edge; each valve with a gibbous projection about the middle.

Hab. Small pond between Hanwell and Southall, Middlesex. Dr. Baird called this "*inopinata*"—unexpected—from its curious *habitat*, it being the second species only recorded as inhabiting fresh-water. It is a very small species, and always creeps at the bottom.

CYTHERE ANGUSTATA, Munster, sp.—Shell oval-oblong, pale yellow-surface polished; when seen under the microscope it is covered with small asperities.

Hab. Devonshire, Dorset, Tenby.

CYTHERE ACUTA, Baird.—Shell oval, convex, pointed at both ends, pale horny; in shape somewhat resembling a grain of oats.

Hab. Arran, in sand.

CYTHERE PELLUCIDA, Baird.—Shell oblong, kidney-shaped, narrow, both ends rounded; pellucid, of a white colour.

Hab. Boston, in sand.

CYTHERE IMPRESSA, Baird.—Shell oval, very convex, surface covered with impressed punctures; colour dull blackish.

Hab. Torquay, in sand.

CYTHERE QUADRIDENTATA, Baird.—Shell oval, oblong, narrower in front, and produced there and terminating in four distinct prominent teeth. Shell white, surface longitudinally striated.

Hab. In sand.

CYTHERE CONVEXA, Baird.—Shell rounded, very convex, and resembling in appearance a small Cowrie-shell. The surface with numerous white raised points, radiating round the circumference.

Hab. Torquay; Tenby, in sand.

Gen. 158. CYTHEREIS, *Rupert Jones*.

Valves of carapace oblong, dorsal and ventral margins parallel to each other; surface irregular, ridged, tubercular; margins toothed or crenulated. Animal unknown; probably like *Cythere*.

CYTHEREIS WHITEI, Baird.—Shell oblong, flat; margin continued straight to the end; the centre of each valve with a sharp crenulated crest.

Hab. Torquay and Tenby, in sand.

CYTHEREIS JONESII, Baird.—Shell thick, oblong; narrow end flattened, with seven strong teeth projecting from the end; centre plane and smooth.

Hab. Isle of Skye, in sand.

CYTHEREIS ANTIQUATA, Baird.—Shell oblong, very thick, roughly granulated with two or three thick ribs along the centre of the valves; circumference wrinkled.

Hab. Isle of Skye, in sand.

BAIRDIA SUBDELTOIDEA, Munster, sp.; Rupert Jones.—Has the carapace triangular, gibbous, acute at the extremities, smooth or setiferous, and sometimes finely punctate; right valve smaller and more angular than the left. This

is widely distributed both recent and as a fossil. Mr. Jones says that as a recent species it occurs in Britain, in the West Indies, Mauritius, Manilla, and Australia. It has been found in the London clay of Copenhagen Fields. See 'Entomotraca of the Tertiary Formation,' p. 52.

FAM. II. CYPRIDINADÆ, *Baird*.

Eyes two, pedunculated. Two pairs of feet-like antennæ. Two pairs of feet, one always within the shell. Abdomen ending in a broad lamellar plate, armed with strong claws and hooked spines.

Gen. 159. CYPRIDINA, *M. Edwards*.

This genus, the characters of which are those of the family, is essentially marine. The pair of feet within the shell forms a peculiar organ, apparently for supporting the ova.

Some of the exotic species are highly luminous, and are described by Mr. Arthur Adams, who observed one in the Eastern seas, as being very quick in motion, darting about with great velocity, and constantly revolving.

CYPRIDINA MACANDREI, *Baird*. (Plate XVII. fig. 2.)—Shell oval, sharply pointed at both ends; convex surface dotted over with small points; anterior edge deeply notched.

Hab. Between Lewis and Skye; dredged by Mr. M'Andrew in seventy fathoms.

CYPRIDINA INTERPUNCTA, Baird.*—Shell oval, less convex than the preceding; surface dull-white, densely and coarsely covered with impressed punctures.

Hab. Off the Isle of Skye; dredged by Mr. M'Andrew.

CYPRIDINA BRENDA, Baird.—Shell oval, rounded at both ends, rather narrower in front, and deeply notched; dull-white; valves smooth and tumid.

Hab. Shetland Islands, off Noss, in eighty to ninety fathoms; dredged by R. M'Andrew, Esq.

CYPRIDINA MARIÆ, Baird.*—Carapace valves elongate, oval, same size at each end; white, shining, mottled with a few spots of dull-white, and covered with minute punctures.

Hab. Off the Isle of Skye (R. M'Andrew, Esq.).

ORDER II. COPEPODA.

Body divided into several very distinct rings. Envelope, a buckler, enclosing the head and thorax. Mouth with foot-jaws. Feet, five pairs, mostly adapted for swimming

* Described by Dr. Baird in the Proc. Zool. Soc. for 1850.

(and hence the name of the Order, from *κοπη*, an oar, and *πους*, a foot). Ovary external.

FAM. *CYCLOPIDÆ*.

Head and body not distinguishable, being consolidated with the first segment of the thorax. Two pairs of foot-jaws. Five pairs of legs; the fifth pair rudimentary. One eye. The male has a swollen hinge-joint to both antennæ. The various species are found in fresh or salt water. Dr. Baird observes, "The fresh-water species abound in the muddiest, most stagnant pools, and in the clearest springs; and the ordinary water, with which the inhabitants of London are supplied for domestic purposes, often contains them in great numbers. The marine species are to be found frequently in immense quantities in small pools on the sea-shore, within high-water mark, living among the seaweeds and corallines which so elegantly fringe the beautiful little wells and clear round pools which are hollowed out in the rocks on the coast, and are to be met with in equal profusion in the open ocean, where, by the curious luminous properties they possess, they assist in producing that beautiful phosphorescent appearance of the sea, the cause of which formerly puzzled naturalists." Jurine has calculated that a single specimen of

the female of the *Cyclops quadricornis* may be the progenitor in the course of one year of 4,442,189,120 young. The young are so unlike the adults, that some naturalists have formed different genera for their reception.

Müller has shown that the *Cyclops* above mentioned has great power of resisting cold. He froze some in a glass vessel, and exposed them for twenty-four hours in a state of congelation; on thawing them he was surprised to find them alive, the females swimming about with their bags of eggs. Plate XVII. fig. 3 *c, d*, shows some of the changes they assume before acquiring their perfect form.

Gen. 160. CYCLOPS, *Müller*.

Foot-jaws large and strong, branched; antennules simple; ovaries double (fig. 3 *b*). The male has both antennæ swollen. (Plate XVII. fig. 3 *a*.)

CYCLOPS QUADRICORNIS, L. (Plate XVII. fig. 3.)—Thorax and abdomen very distinct from each other, the former twice the size of the latter. It is a variable species, differing much according to age, locality, and other circumstances; it is sometimes white, at other times tawny, green, or red.

Hab. Ponds and ditches. Common everywhere.

Gen. 161. CANTHOCAMPTUS, *Westw.*

Foot-jaws small, simple ; antennules simple ; ovary single.

CANTHOCAMPTUS MINUTUS, Müller, sp.—Thorax and abdomen not distinctly separated from each other, composed of ten segments, gradually diminishing in size as they descend. The animal frequently turns up the posterior part of the body over the other, like the species of *Staphylinidæ*.

Hab. Ponds and ditches of fresh-water.

CANTHOCAMPTUS STROMII, Baird.—Thorax and abdomen of ten segments, gradually tapering to the end ; antennæ of eight short joints.

Hab. Sea-shore at Cockburnspath, and at Dover.

CANTHOCAMPTUS FURCATUS, Baird.—Thorax and abdomen very distinctly separated, composed of ten segments, the first the largest, the last ending in two short lobes, from which proceed four setæ, two much longer than the others.

Hab. Sea-coast, Berwickshire ; Kent ; Dorset.

CANTHOCAMPTUS MINUTICORNIS, Müller, sp.—Thorax of four segments, each terminating at the back in a sharp spine ; abdomen of five segments, last one bilobed, with a stout seta half the length of animal.

Hab. Berwick Bay; Dover.

Gen. 162. ARPACTICUS, *M. Edwards.*

Foot-jaws forming strong cheliform hands; antennules simple; ovary single.

ARPACTICUS CHELIFER, Müller, sp.—Thorax of four, the abdomen of six, segments; the last one ending in two long, finely-serrated, bristles, fully the length of body. Head beaked.

Hab. Sea-shore, Berwickshire; Kent.

ARPACTICUS NOBILIS, Baird.—Three times larger than the *A. chelifer*; the whole animal beautifully coloured with green, red, and purple; thorax large, rounded, of four segments; the body of six slender segments, the last bilobed and with four setæ, two long and two short.

Hab. Berwick Bay, and Dover.

Gen. 163. ALTEUTHA, *Baird.*

Foot-jaws small, simple; body flat. Fifth segment of body with two strong falciform appendages. Dr. Baird found the curious species on which he founded the genus

in Berwick Bay. He describes its motion as very peculiar; it generally swims on its back, and instead of darting forward through the water, like the other species of the family, it springs with a bound from the bottom of the vessel, where it remains when undisturbed, up to the surface of the water. It effects this by curling its body into a ball, and then suddenly assuming a straight position.

ALTEUTHA DEPRESSA, Baird.—Body depressed, flat, broad; eye of a fine ruby colour.

Hab. Berwick Bay.

FAM. II. *DIAPTOMIDÆ*, Baird.

Head generally distinguishable from the body, though firmly articulated with first ring of thorax. Three pairs of well-developed foot-jaws. Five pairs of legs, last pair of different structure from the others, and differing from each other in the two sexes. One eye. In the male, one of the antennæ alone is furnished with a swollen hinge-joint, with which he seizes and holds the female.

Gen. 164. *DIAPTOMUS*, Westwood.

Head distinguishable from the thorax; thorax and ab-

domen each of five segments; antennules composed of two branches.

DIAPTOMUS CASTOR, Jurine, sp. (Plate XVII. fig. 4.)—Of a transparent hue, delicate red, sometimes blue; antennæ long and strong, of about twenty-six joints.

Hab. In ponds and slow-running water.

M. Jurine has named the species *Castor*, or the beaver, from a fancied resemblance he saw in the abdomen of the female, when loaded with eggs, to the tail of a beaver.

Gen. 165. TEMORA, *Baird*.

Head joined to first segment of the thorax; thorax of five, abdomen of three, segments; antennules two-branched; five pairs of legs, the first four with a branch of two joints.

TEMORA FINMARCHICA, Gunner, sp.—Body dark-brown (in spirits); antennæ very long, of twenty-four joints.

Hab. Coast of Ireland.

Gen. 166. ANOMALOCERA,* *Templeton*.

Head distinguishable from body, with a beak divided at

* From *ανωματος*, dissimilar, and *κερας*, a horn.

tip into two sharp points, and ending at the base on each side in a sharp, hooked spine. Thorax in six, abdomen in four, segments. Antennules not two-branched. Anterior antenna of male geniculated, swollen. Foot-jaws strongly developed. Eye in the male pedunculated. Mr. Lubbock has observed five eyes in this genus, four upper, one lower.* The species swims with a lively and constant motion, and jerks out of the way when pursued.

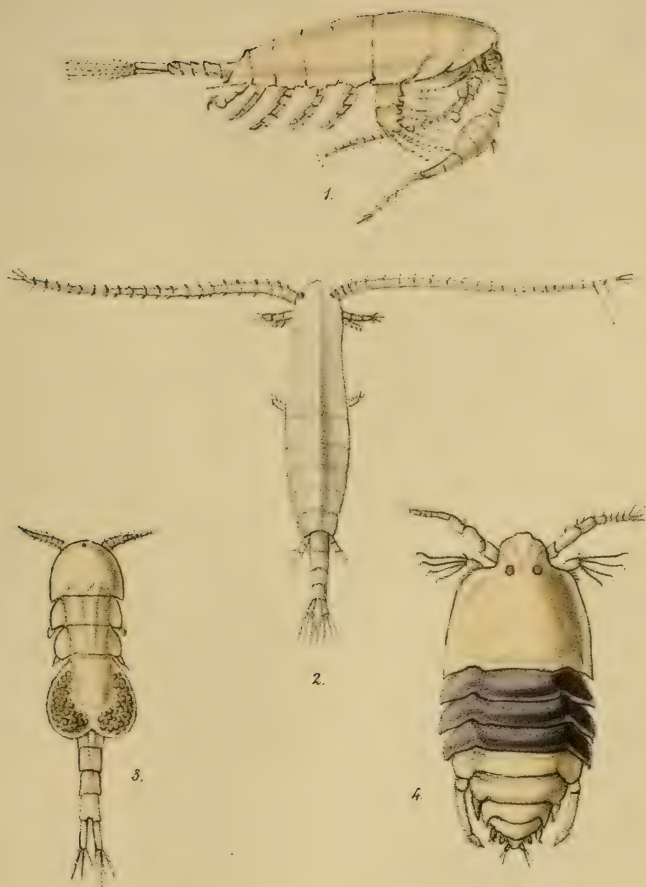
ANOMALOCERA PATERSONII. (Plate XVIII. fig. 1.)—It is about three lines long, and when alive is very brilliant. Mr. Goodsir describes it as having a luminous appearance, apparently caused by the splendid metallic colours with which it is adorned, sapphirine and emerald prevailing. These colours disappear rapidly after death.

Hab. Irish and Scotch coasts.

FAM. III. *CETOCHILIDÆ*.

Head distinguishable from body, but firmly articulated with the first ring of thorax. Three pairs of strongly developed foot-jaws. Five pairs of legs. Two eyes. Right antennæ in male furnished with swollen hinge-joint.

* Ann. and Mag. Nat. Hist. 1853, pp. 164, 165.



Sowerby del. et lith.

Vincent Brooks imp.

Anomalocera Patersoni 2. *Cetodius septentrionalis* 3. *Notadephye*
Ascidiolella 4. *Petridium purpureum*.

Gen. 167. CETOCHILUS,* *Roussel de Vauv.*

Head furnished with two small, styliform prolongations. Antennules of two branches, of nearly equal size. Foot-jaws not branched. Thorax of six, abdomen of four, segments. Last pair of legs formed like the others.

Dr. Baird gives the following account of the reason why the founder of the genus gave it the name:—"Vauzeme was attached to a vessel employed in the whale fishery in the Southern Ocean, and for four months the crew were engaged in the neighbourhood of Tristan d'Acunha, in the South Atlantic, without his ever having been able to observe what formed the food of the whales. Leaving that quarter however at the end of that time, and steering for Cape Horn, he, one morning in the month of February, observed the surface of the sea streaked with red lines, several miles in extent, and giving the appearance of blood to the water. The experienced sailors on board immediately announced that they had now reached the *pasture* of the whales. Accordingly they very soon afterwards saw them sporting about in the midst of these ruddy banks. Upon examining the water thus coloured, Vauzeme found it caused by an im-

* From *κητος*, a whale, and *χίλος*, food.

mense number of small Crustaceans, which were of a red hue. They swarmed in myriads on the surface of the sea, and, when the wind was boisterous, a whole bank of them could be taken up by a wave and carried on board the vessel, covering the deck and the clothes of the sailors. The whales swallowed them in myriads, and they served for food, not only to them, but to the *Coronulæ* and *Tubicinellæ* which live as parasites upon their skin. The American fishers on that station informed him that these little creatures, in the fine weather of October and November, remain concealed deep under the water, but that after that time they come to the surface to lay their eggs.”*

The late R. H. Goodsir observed in the Firth of Forth that during the summer months animal matter in great masses abounds on the surface of the sea. The fishermen call it *maidre*. On a minute examination of this matter, he found it to consist of *Cirrhipedes*, *Crustacea*, and *Acalepha*. Amongst these the moving masses of *Entomostraca* were very conspicuous; so much did they abound that it was almost impossible to see anything even a few inches below the surface. He adds, “If a clear spot is obtained, so as to allow the observer to get a view of the bottom, immense

* British Entomostraca, p. 234.

shoals of codfish are seen swimming lazily about, and devouring their minute prey in great quantities. Occasionally small shoals of herrings are seen pursuing them with greater agility. . . . Great numbers of *Cetacea* often frequent the neighbourhood of the island at this time, droves of dolphins and porpoises swimming about with great activity, and occasionally an immense rorqual may be seen, raising his enormous back at intervals from the water, and is to be observed coursing round and round the island." Among the *Entomostraca* the red *Cetochilus* was very marked, the sea being sometimes slightly red with them.

The observing Arctic voyager and whaler cannot fail to be struck with the elegant motions of these creatures. For instance, my friend Dr. Sutherland, who was surgeon of the 'Sophia' on her Arctic search for Sir John Franklin and his comrades, thus refers to them in his Journal of May 23, 1850 :—" *Entomostraca* of very large size (*Cetochilus*) darted in the water with the swiftness of arrows. Nothing could exceed the gracefulness of their motions, when, with every jerk, the two long oar-like antennæ were thrown elliptically in the form of curves along the body, but not touching any part of it, until they met at the last segment. It was only during the rapid movements of the *Cetochilus* that

the antennæ assumed this position, for it could be seen making slow progress in the water with the antennæ at right angles to the body. The antennæ are surmounted by a tuft of bristle-like spines pointing backwards. The last segment of the body terminates also in a number of spines or setæ, which, in many individuals, are of a beautiful reddish and pearly colour, and by means of which a person is enabled to detect them in the water. They are always on the alert to elude and escape from their pursuer. When the water is but slightly agitated they dive from the surface, and, in a few minutes, when it becomes still, they can be seen ascending slowly, but rarely using the antennæ. I could only obtain specimens by including them in a large quantity of water taken up suddenly, from which they could be separated subsequently by straining through a calico bag. A bucketfull (two gallons) of water often produced twenty to thirty individuals, and sometimes twice that number. They never survived a single night, even though kept in their native element in a vessel. From their constant darting from side to side of the vessel, perhaps it is a safe inference that the fear of danger in their new situation may be one of the chief causes of the early extinction of life.”*

* Dr. Sutherland, ‘Voyage to Baffin’s Bay,’ vol. i. pp. 71, 72.

CETOCHILUS SEPTENTRIONALIS, Goodsir. (Plate XVIII. fig. 2.)—Bright-red and slightly translucent; about a line and a half or two lines long. Antennæ very long and slender, of twenty-four joints, the twenty-second and twenty-third joints each furnished with a long seta pointed downwards and inwards.

Hab. Firth of Forth.

Next to *Cetochilus* Dr. Baird provisionally places the next genus, which he says must form the type of a new family.

Gen. 168. NOTODELPHYS, *Allman*.

One eye. Head and first ring of thorax consolidated. Thorax of four, and abdomen of four segments. Upper antennæ many-jointed; lower prehensile. Four pairs of foot-jaws. Ovary, a large sac placed behind the last ring of the thorax, and within the parietes of the body.*

NOTODELPHYS ASCIDICOLA, *Allman*. (Plate XVIII. fig. 3.)—Upper antennæ of twelve short joints, each with one or more setæ. Abdomen somewhat cylindrical.

Hab. Belfast Bay, and other Irish harbours: found swimming freely in the branchial sac of the *Ascidia communis*.

* Hence the name, from *νωτος*, back, and *δελφς*, matrix.

Gen. 169. PELTIDIUM, *Philippi*.*

The body covered with a large shield formed of seven segments; first segment the largest. Two large, six-jointed antennæ. Legs, six pair; first pair simple, with a long claw; the second, third, fourth, and fifth pairs with two branches; the sixth pair simple. Tail with the tip bifid, and bearing bristles.

PELTIDIUM PURPUREUM. (Plate XVIII. fig. 4.)—Our figure is from an original drawing by Mr. Spence Bate. The species was first ascertained to be British by that gentleman, who took it on the southern coast.

Gen. 170. HERSILIA, *Philippi*.†

Body covered with a large shield formed of four segments. Antennæ, two, large, filiform, five-jointed. Feet, four pairs; three with a bifid pinnule, the fourth simple. Tail with a bifid tip, and bearing bristles.

HERSILIA APODIFORMIS.—This curious Crustacean was

* Wiegmann, Archiv, 1839, 132, taf. iv. f. 12.

† Wiegmann, Archiv, 1839, 130, t. iv. f. 9, 10, 11

first found by Dr. Philippi in the Mediterranean. Mr. Spence Bate discovered it on our southern coast.

LEGION III. PÆCILOPODA,* *Latr.*

Mouth adapted for sucking. Feet partly formed for walking or prehension, and part branchiferous, and fitted for swimming. Body in the greater part of the species enclosed almost wholly within a buckler, consisting generally of one piece, sometimes of two.

The various species are parasitical on fishes and other aquatic animals.

ORDER SIPHONOSTOMA,† *Latr.*

Mouth furnished with a tube which has styliform mandibles. Thorax composed of several distinct rings, and with three or four pairs of feet. Foot-jaws well developed.

Tribe 1. PELTOCEPHALA, *M. Edwards.*

Head shaped like a buckler,‡ provided in front with frontal plates and short antennæ of two flattened joints.

* Ποικίλος, various, and πους, foot.

† Σιφων, a tube, and στομα, a mouth.

‡ Hence the name, πελτη, a shield, and κεφαλη, a head.

Dr. Baird says: "The mouth-apparatus consists of a large well-developed sucking-tube and appendages, adapted for puncturing the skin of the animals upon which they live as parasites, and for sucking the juices of their bodies; and three pairs of foot-jaws, constructed for enabling them to fix themselves upon their prey." When young they undergo a series of metamorphoses.

FAM. ARGULIDÆ, Leach.

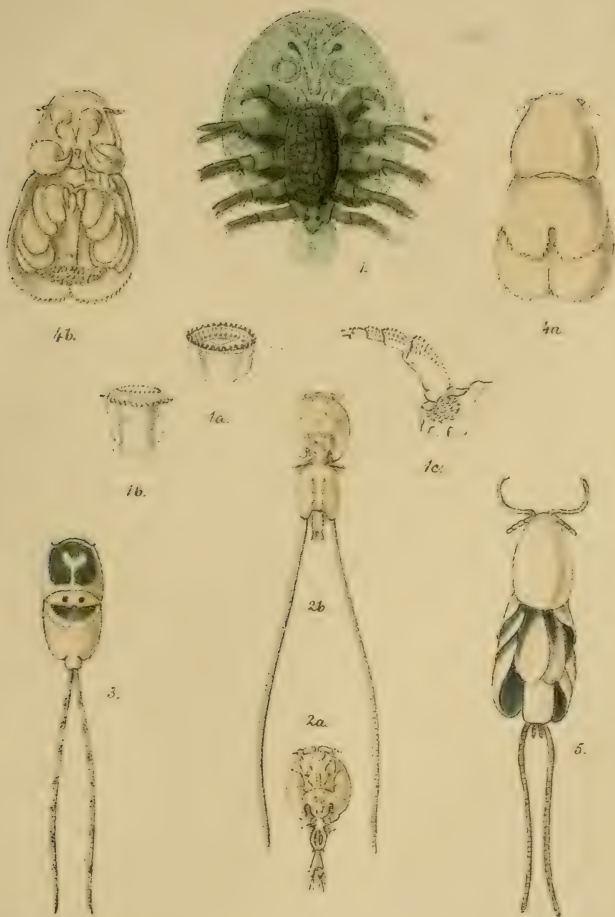
Head like a large circular-shaped shield. Antennæ short, thick, two-jointed; second pair of foot-jaws replaced by a pair of large suckers. (Plate XIX. fig. 1 *a*, *b*.)

Gen. 171. ARGULUS, Müller.

ARGULUS FOLIACEUS, Linn. sp. *Fish Argulus*. (Plate XIX. fig. 1.)—Rounded-oval; carapace notched on either side in front, transparent, slightly greenish, and marked on both sides by branched veinings of darker hue.

Hab. On various kinds of fresh-water fish in the neighbourhood of London: it is most commonly met with on the stickleback.

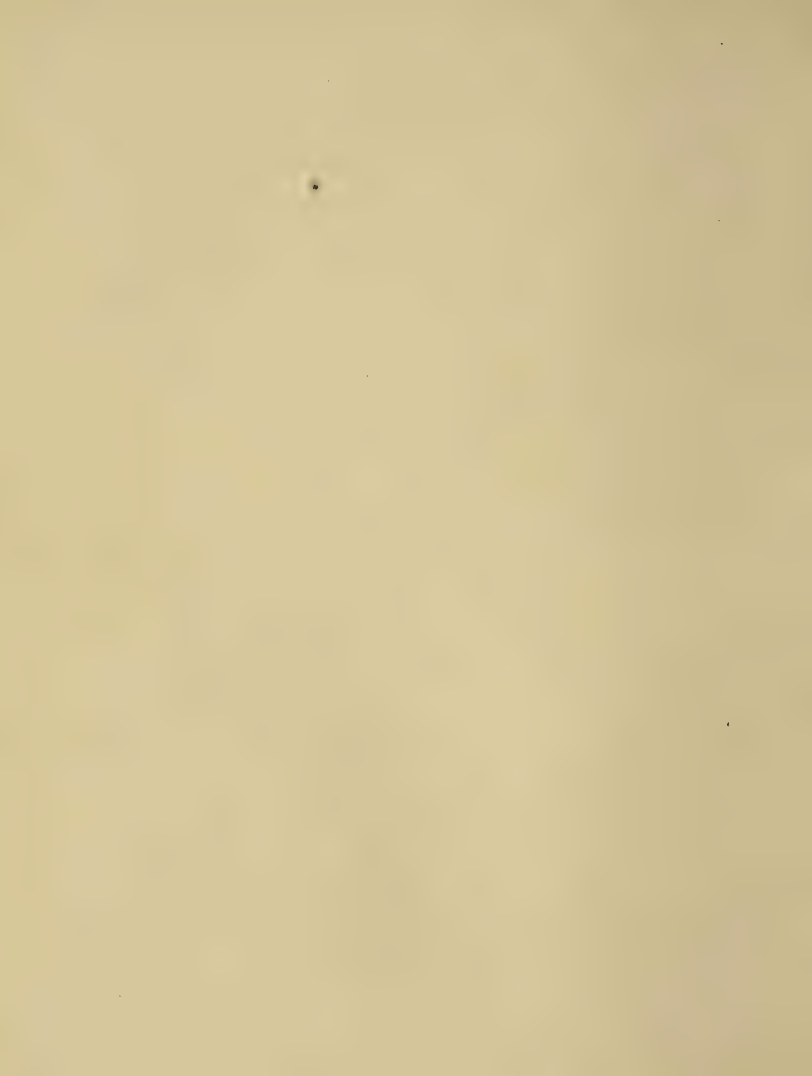
Dr. Baird says, it "is an exceedingly pretty and graceful



Sowerby del. & Rich.

Vincent Brooks imp.

1. *Argemone felineus* 2. *Leptochthyrus Strömii*, a, male, b, fem. 3. *Pandarus niger*.
4. *Hamargus muricatus*. 5. *Anthosoma Smithii*.



little animal, and as it can leave the fish upon which it feeds, and swim freely in the water, there are many opportunities for watching its gambols through its native element. It generally swims in a straight line, but it frequently suddenly changes its direction, and often turns over and over several times in succession."* Its swimming-feet are in constant motion, and serve also for respiration. Dr. Baird says that when it wishes again to fasten itself to its prey, the *Argulus* approaches a fish, and quietly allows itself to be hurried along in the current caused by its motion through the water, till it touches it, when it quickly attaches itself to the under part of the pectoral fins. The males are considerably smaller than the females: the latter have as many as four hundred eggs, which, having slipped off the fish, she attaches in a mass to a stone or some solid body. The female has a black mark on each lobe of the abdomen.

FAM. *CALIGIDÆ*, Baird.

Head shaped like a large buckler, having in front large frontal plates. Four pairs of feet furnished with long plumose hairs. Antennæ small, flat, two-jointed. Second pair

* British Entomotraca, p. 252.

of foot-jaws of two joints, and not like a sucking-disc. Segments of thorax uncovered. Body more or less oval, depressed. Eyes two, close together : in the living animal, of a red colour, and slightly projecting.

The species of this family are found on various fishes in the sea. They adhere to the body among the scales, being attached by their foot-jaws. They can move to any part of the fish. They die soon after the fish is taken from the water. There seems to be some doubt as yet about their food. The most minute observers seem to think that it is chiefly, if not wholly, on the mucous juices of the fishes that they subsist, those juices which cover the body of the fish, and for secreting which in abundance there are, in most fishes, a series of particular pores. The fishes on which they are found are generally weak and diseased. The young *Caligidæ*, when first hatched, are very different in appearance from the adult : they closely resemble the young of the *Cyclopidaæ*, and undergo, like them, a number of changes of skin before they assume the completely-developed form of the parent.

Gen. 172. CALIGUS, *Müller*.

Thorax of only two distinct joints. Frontal plates with a small sucking-disc on the under surface of each side. Fourth pair of feet slender, of one branch, and used for walking.

CALIGUS DIAPHANUS, Nordmann.—The male has the carapace large, and nearly round; thorax much smaller than carapace.

Hab. On the turbot, gurnard, mackerel, coal-fish, cod-fish, and others, in Belfast Bay.

CALIGUS RAPAX, M. Edw.—The female has the carapace oval, much longer than broad; frontal plates large and nearly straight in the centre; antennæ very large. The male rather smaller than female, and has the last joint of thorax smaller; the abdomen is longer and narrower.

Hab. Belfast Bay: on the gurnard, John Dory, whiting, and other fishes.

CALIGUS MULLERI, Leach.—In the female the carapace is oval, rather longer than broad; the frontal plates large, notched in the centre. Antennæ with basal joint large. Abdomen very short and rounded. In the male the last joint of thorax is smaller and more rounded.

Hab. On cod and brill.

CALIGUS CENTRODONTI, Baird.—Carapace, in the female, obovate, narrower in front; frontal plates deeply notched in the middle. Thorax much smaller than carapace, last joint squareish, lower margin crescentic. Abdomen very small, quite concealed by ovarian tubes when filled with ova. In the male the carapace is large, the thorax much smaller.

Hab. Found on the tail and fins of the *Pagellus centrodontis*, Dublin.

Gen. 173. *LEPEOPHTHEIRUS*,* *Nordmann*.

Thorax of two distinct joints. Frontal plates without small sucking-disks on their under surface. Fourth pair of feet slender, of one branch, and serving for walking.

LEPEOPHTHEIRUS STRÖMII, Baird. (Plate XIX. fig. 2.) —Carapace, in the female, oval; frontal plates not very prominent; length of body, about half an inch; horny tubercles on hind part of thorax, large and simple. Male much smaller than the female.

Hab. Berwick: on salmon.

LEPEOPHTHEIRUS PECTORALIS, Müller, sp.—Carapace, in

* From λεπος and φθειρ.

female, oval; frontal plates small, notched in centre; caudal plates small; sternal fork with simple sharp-pointed branches. Thorax as long as carapace.

Hab. Belfast Bay and other parts of our coast, on the flounder, John Dory, mackerel, sole, and dragonet.

LEPEOPHTHEIRUS NORDMANNII, M. Edw. sp.—Carapace, in female, rounded-oval, diaphanous. Frontal plates prominent in centre, not notched. Thorax much shorter than carapace. Oviparous tubes long and slender.

Hab. Coast of Antrim, on the *Orthogoriscus mola*.

LEPEOPHTHEIRUS HIPPOGLOSSI, Kroyer, sp.—The whole animal beautifully marked with pink or reddish spots, distributed in an irregular pattern over all the carapace, thorax, abdomen, and outer surface of fourth pair of legs. Sternal fork twice bipartite.

Hab. On halibut, in Berwick Bay.

LEPEOPHTHEIRUS OBSCURUS, Baird.—Carapace large, rounded-oval. Thorax much smaller than carapace. The abdomen small, square. Caudal plates stout, and giving off four long, finely plumose setæ. Sternal fork with each branch bifurcated. The fourth pair of feet very long and stout.

Hab. On brill taken in Belfast Bay.

LEPEOPHTHEIRUS THOMPSONI, Baird.—Carapace round; in the male rather broader. Abdomen long, the length of thorax. Caudal plates short, rather broad. Sternal fork with sharp, simple branches.

Hab. Ireland: on the turbot.

Gen. 174. CHALIMUS, *Burm.*

Feet as in preceding. Thorax with four distinct segments. Frontal plates without sucking-discs, but furnished with a long and slender appendage from the centre of fore surface.

Dr. Baird remarks on this curious genus, which Kroyer was disposed to think might prove the young of *Caligus*, that the long and slender organ above alluded to ends in a "round expansion like a sucker, by which it fastens itself to the body to which it is found attached. The presence of this organ would lead us to suppose that this animal must lead a much more sedentary life than the rest of the *Caligidæ*, and it would appear in this respect to connect it with some of the *Lerneadæ*, which we shall find to possess a somewhat similar organ of prehension."

CHALIMUS SCOMBRI, Burm.—Carapace elongated-oval, somewhat narrower in front. Thorax of four distinct segments. Abdomen large, of three joints.

Hab. Belfast Bay: attached to *Caligus Mülleri*.

Gen. 175. TREBIUS, Kroyer.

Fourth pair of feet slender, and divided into two branches, adapted for swimming. Thorax possessed of three distinct joints. Frontal plates without sucking-discs.

TREBIUS CAUDATUS, Kroyer.—Male much smaller than the female; in the latter the carapace is oval, the first pair of foot-jaws is large and strongly toothed at the apex; the abdomen is long and narrow, and ends in two small tails, which have one short and three long plumose bristles. In the male these tails are larger.

Hab. Belfast Bay: on the skate. First found in these islands by the late Mr. Thompson.

FAM. PANDARIDÆ.

One of the prettiest of the families of the fish-parasites.

The head is shaped like a small buckler, and furnished with frontal plates. There is a series of one or more pairs of lamellar appendages, which extend along the back of the thorax. The egg-bearing tubes straight, external.

Gen. 176. DINEMOURA,* *Latr.*

The plate-like appendages covering the thorax are two only. The first three pairs of feet are setiferous; the posterior are foliaceous and membranous.

The first species here quoted, and figured, with all the others in Dr. Baird's excellent work, when viewed from above, resembles somewhat an undressed doll with the head and neck and part of the legs removed.

DINEMOURA ALATA, M. Edw. sp.—Oblong; about half an inch long. Dorsal plates of a chestnut-colour, and with pale, scattered dots.

Hab. Berwick Bay: on the Beaumaris shark.

The late Dr. Johnston, of Berwick, first described this as British. He remarks (Loudon's Mag. Nat. Hist. viii. 203) that it appears to be parasitical on several species of fish; and that the creature generally attaches itself to the sides of the branchial covers, and adheres tenaciously, by thrust-

* Δις, two, νημα, thread, and ουρα, tail.

ing the claws of the first and third pairs of foot-jaws through the skin.

DINEMOURA LAMNÆ, Johnston, sp. — Linear-oblong ; dorsal plates smaller than in preceding, oval, smooth, and of a pale colour ; cephalothorax with a brown blotch in front ; centre of upper part of last segment of thorax with a long black spot.

Hab. Berwick Bay : on a Beaumaris shark (*Lamna Monensis*).

Gen. 177. PANDARUS, *Leach*.

There are several pairs of plate-like appendages covering the thorax. All the feet fitted for walking, and armed near the end with short thick hooks. Dr. Baird adds, that "these hooks are evidently useful to the animal in moving or walking, by enabling it to attach itself to the bodies upon which it creeps."

All the species are parasitic on the shark tribe ; so that these ferocious tyrants of the sea are themselves subject to fish-lice.

PANDARUS BICOLOR, *Leach*. (Plate XIX. fig. 3.) — Body elongated-oval. Cephalothoracic segment, and the second

and third thoracic plate-like appendages, marked in the centre with black patches. A variety (*P. Boscii*) apparently of this has the body of a pale colour.

Hab. Torcross, Devon, on the *Mustelus vulgaris* and *Galeus*. Mr. Cocks, of Falmouth, took the species from a specimen of the *Carcharias glaucus*, captured a few miles from Falmouth harbour in 1849.

FAM. CECROPIDÆ, Baird.

Head as in *Pandaridæ*. There is a single plate-like appendage on the dorsal surface of the thorax. The oviferous tubes are concealed under a shield-shaped plate, and twisted in many convolutions.

The naturalist, Dr. Baird tells us, who went out in the expedition under the command of the "unfortunate La Peyrouse," found a poor diseased sunfish, on the coast to the north-east of Nootka Sound, infested by different species of parasites (the one on the gills was a *Cecrops*); and it is on a species of sunfish (*Orthogoriscus mola*), occasionally caught on our coasts, that the British *Cecrops* has been always found.

Gen. 178. CECROPS, *Leach*.

Plate-like appendage small and rounded. The male has all the feet, and the female only the first three pair, adapted for walking, and armed at the tips with short, stout spines. The oviferous tubes are very long and slender, and are twisted on each other in numerous loops, and lie concealed in the hollow space between the abdomen and the large, buckler-shaped, last segment of the thorax.

CECROPS LATREILLII, *Leach*.—Of a pale horn-colour; front edge of carapace deeply notched; the plate-like appendage and last thoracic segment of the body less deeply notched; hooks at end of foot-jaws deep black. Length of female, an inch; of male, about the third of an inch.

Found on the gills of the sunfish, occasionally caught on the coasts of England and Ireland.

Gen. 179. LÆMARGUS, *Kroyer*.

Plate-like appendage of considerable size; the feet are all foliaceous and branchial; upper segments of thorax distinct and small; males, as in last genus, much smaller than the females.

LÆMARGUS MURICATUS, Kroyer. (Plate XIX. fig. 4.)—Plate-like appendage and the last thoracic segment finely toothed round the lower margin, and both deeply notched.

This species has been found, like the last, on the sun-fish (*Orthogoriscus mola*).

Tribe 2. PACHYCEPHALA.

Head generally much smaller than in the preceding, and generally rather thick, and blunt. Antennæ much longer, and of five and six or even more joints; basal joints of feet detached from each other.

FAM. ANTHOSOMADÆ, Baird.

Head of considerable size; near the mouth there is a pair of large foot-jaws, armed with strong hooks. Thorax furnished with plate-like appendages. There are three pairs of foliaceous feet.

Gen. 180. ANTHOSOMA, Leach.

Dr. Baird remarks on this genus, that “from the form of the feet and the large development and prehensile structure of the foot-jaws, it is evident that the animals are incapable

of much motion, and are more adapted than any of the others we have yet described for living strictly as parasites. They seem to bury their beak in the flesh of their prey, and no doubt cause much irritation to their unwilling host. The gill-covers to which they were found adhering, showed the marks of inflammation of long standing, as they were much thickened.”*

ANTHOSOMA SMITHII, Leach. *Bud-like Shark-sucker*. (Plate XIX. fig. 5.)—Of an elongated-oval form, and of a yellowish-white colour, with a black spot on the middle of the head, disappearing after death.

Found sticking on a shark (*Lamna Cornubica*) thrown ashore at Exmouth. Dr. Leach gave this the generic name from the creature having some resemblance to the half-opened bud of a flower.

FAM. ERGASILIDÆ.

Head of moderate size, rounded. Body oval or pyriform; the thorax sometimes much enlarged laterally. Feet very small and branched; abdomen well developed.

* British Entomostraca, p. 298.

Gen. 181. NICOTHOE, *Edw. & Audouin*.

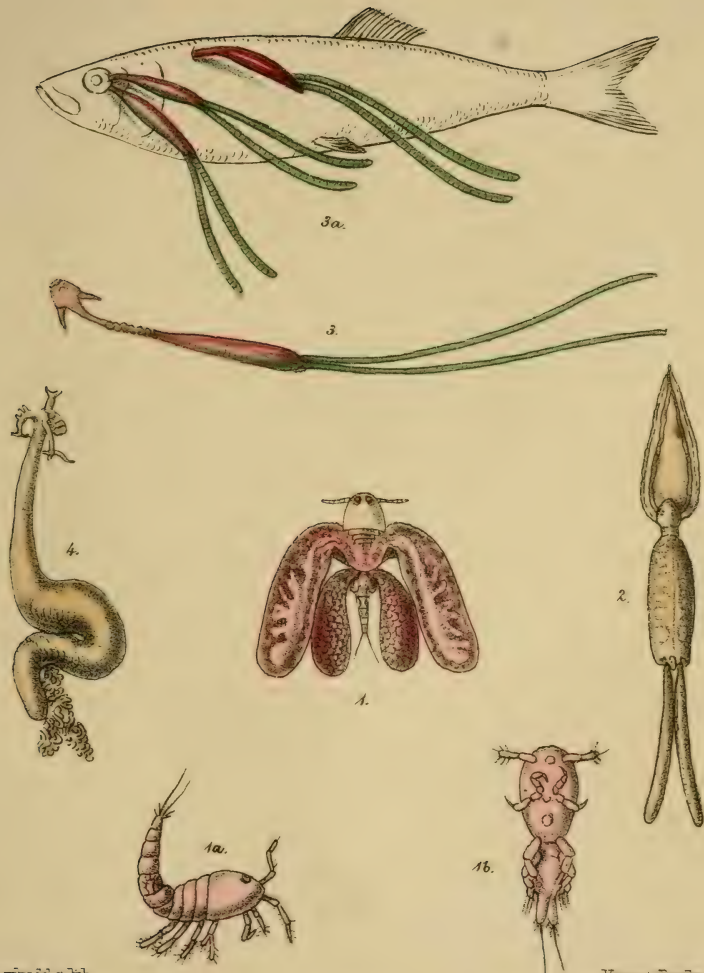
Two eyes ; antennæ slender, many-jointed ; foot-jaws very small. Thorax of female enlarged on the side into two large wing-shaped lobes ; in the male these appendages are wanting. There are four pairs of feet, which are two-branched and jointed. The body is jointed.

The species of this curious genus is found attached, often in considerable numbers, to the gills of the common Lobster, and remains firmly fixed among the filaments of these organs.

The male, according to Professor Van Beneden,* is much smaller than the female, and leads a free life, as does the young female at first : as soon as the latter fixes itself to the branchiæ, lateral prolongations appear, to the height of the fourth thoracic ring. In the adult state these appendages seem to form the whole animal.

NICOTHOE ASTACI, Aud. & Edw. *Lobster Louse*. (Plate XX. fig. 1.)—Of a rosy hue, about a line long. Dr. Baird has found it on the gills of the Lobster in the London market in March and April, and Mr. Cocks in a Lobster taken at Falmouth, in September.

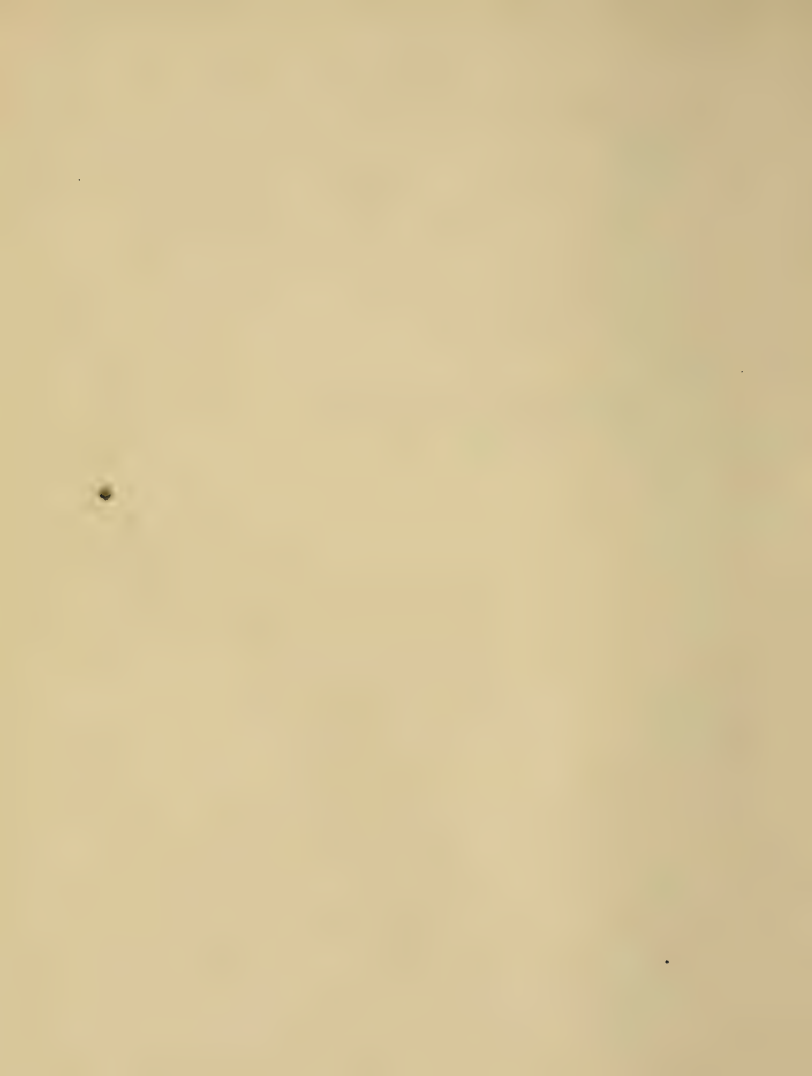
* Mémoire sur le Développement, etc., des Nicothoës, in vol. xxiv. of the Mémoires de l'Académie Royale de Belgique.



Sowerby del. & lith.

Vincent Brookes imp.

1. *Nicotloe Astaci*, 1a. b. larva. 2. *Lernæopoda elongata*. 3. *Lernæcnema Spratta*, 3a, three specimens attached to a Sprat. 4. *Lernæa branchialis*.



ORDER *LERNEADÆ*.

The mouth suctorial ; thorax not jointed. Feet and other organs of thoracic segment nearly rudimentary. Body very *outré* in appearance.

The animals of this Order were placed by Linnæus among the worms, and most authors followed the illustrious Swedish naturalist, as Dr. Baird tells us, till M. Surriray, a French physician at Hâvre, “made the important discovery that the ova were contained in the long filaments suspended from the abdomen, and that the young, when born, bore no resemblance to their parent, but on the contrary were extremely similar to the young of the *Cyclops* ;” and shortly after Professor Nordmann clearly established their characters to be those of the Crustacea.

These fantastically-formed creatures are all parasites on fishes : Dr. Baird says, “We find them in all instances more or less deeply fixed in the tissue of the parts upon which they have taken up their habitation, and often so deeply lodged, that little else but the oviferous tubes are visible externally. There they remain, living at the expense of their host ; those that inhabit the branchiæ, or are deeply fixed in the soft tissue of the bodies, drinking up the blood ; and the

others, which are fixed less deeply, and take up their abode under the fins and such places, sucking the slimy juices of the skin." The young have a large eye, and are furnished with two large pairs of swimming-feet, and are nimble and active, so that, as Dr. Baird says, "it is not the least curious part of the history of these singular-looking animals that the young should thus stand on a higher stage of development than the mother."

The first tribe is named *Anchorastomacea*, by Dr. Baird, from the females being fixed to their prey by means of the foot-jaws, which are strong and armed with hooks. There is one pair of antennæ; the thoracic feet are nearly rudimentary, or represented by large appendages. The males are very small, free, and unattached, and totally unlike their partners.

. FAM. *CHONDRACANTHIDÆ*, Baird.

Foot-appendages large, cartilaginous, generally three pairs; three pairs of foot-jaws.

Gen. 182. *CHONDRACANTHUS*, *Delaroche*.

This genus derives its name* from its appearing to be

* *Χονδρος*, cartilage, and *ακανθα*, a spine.

stuck over with cartilaginous spines or tubercles. The oviferous tubes are very short, broad and flattened.

CHONDRACANTHUS ZEI, Delaroche.—Body short and thick; upper part of thorax covered with short, conical, sharp-pointed spines.

Found on the gills of the *Zeus faber*.

Gen. 183. LERNENTOMA, *Blainv.*

This genus differs from the last chiefly in the oviferous tubes being long, either club-shaped and stout, or slender and twisting.

LERNENTOMA CORNUTA, Müller, sp.—Head oval, rather elongated in female; head in male very large and swollen. The antennæ project. In the female there are two pairs of thoracic appendages visible, each divided into two digitations. Length of female, three lines; of male, the quarter of a line.

Found by the late Mr. Thompson on the branchiæ of a sole caught in the Irish Sea.

LERNENTOMA ASELLINA, Linn. sp.—Male like that of last species; the female has a small head placed at the end of a long slender neck; the thorax is broad, and has two pairs

of three-fingered appendages on the upper half; on the lower part there are three simple appendages.

Found on the gills of *Triglæ*, at Falmouth.

LERNENTOMA LOPHII, Johnston, sp.—The oviferous tubes in the female are very long, slender, and twisted. Head on each side with a process directed backwards. Thorax divided into four portions by as many contractions.

Found on the Angler-fish (*Lophius piscatorius*), on the coasts of Great Britain and Ireland.

Dr. Baird has named the second tribe

ANCHORACARPACEA, from the species being fixed to their prey by means of two long appendages arising from the thorax; these unite at the base or near the tip only, and end there in a rounded button-like knob. There are no thoracic feet or appendages representing them. In the family *Lerneopodadæ* the arm-shaped appendages are long and united only at the tip.

Gen. 184. LERNEOPODA, *Blainv.*

In the female the body is elongated and oval; the head short and thick; there are two pairs of foot-jaws; the external ovaries are moderately long and cylindrical. In the

male the body is divided into two nearly equal ovoid portions, one being the head, the other the thorax.

The first species mentioned here was figured by the late Dr. Scoresby in his 'Arctic Regions.' It is found attached to the eye of the Arctic shark, and seems to blind it; the sailors believe this shark to be blind, as it pays not the least attention to the presence of man, and does not draw back when a blow is aimed at it with a knife or lance.

LERNEOPODA ELONGATA, Grant, sp. *Grant's Shark-sucker*. (Plate XX. fig. 2.)—This is three inches long; the thorax is long and narrow, and has two long cylindrical arms, considerably longer than the body; ovaries nearly the length of the entire body. Dr. Baird mentions that a specimen of this Arctic species was taken from the eye of a shark taken on the English coast; its arm-shaped appendages were inserted into the cornea to the depth of nearly a fourth of their length.

LERNEOPODA GALEI, Kroyer.—Length about three-fourths of an inch; ovaries not quite equal to length of thorax.

Found on the *Squalus Galens*, taken at Belfast.

LERNEOPODA SALMONEA, Linn. sp.—Body obovate, thorax obcordate, two arms linear, approximated; ovaries thick, as long as the whole animal; white. Length, half an inch.

Found on the gills of the salmon.

In salt-water, according to Müller and Dr. Knox, the salmon is subject to the attacks of *Caligi*, which adhere to his integuments, and when in his migrations he runs up rivers, the fresh-water destroys them; in the fresh-water again he is attacked by another parasite, the *Lerneopoda salmonea* (Baird, Brit. Ent. t. 35, f. 6), which fastens on his gills, and when the salmon gets into the sea again, these vital organs are cleared from the parasite.*

FAM. *ANCHORELLADÆ*, Baird.

Arm-shaped appendages very short, and united from the base, so as to resemble a single organ.

Gen. 185. *ANCHORELLA*, Cuv.

Head of female small, at the end of a long neck, generally curved backwards; two pairs of developed foot-jaws, and a third rudimentary. Ovaries of moderate length. Male very small.

ANCHORELLA UNCINATA, Müller, sp.—Body milk-white, oblong; the arms short, ending in a rounded knob. The

* Trans. Roy. Soc. Edin. xii. 471.

female is from six to eight lines long, while the male is only the fourth of a line.

Found on the fins and gill-covers of the cod and haddock.

ANCHORELLA RUGOSA, Kroyer.—Body nearly square, a little notched on the side. Ovaries rather longer than the thorax. Length about three lines.

Mouth of *Gadus cellarias*, taken on the Irish coast.

In the next tribe, the females are attached to their prey by the front part of their body only, the whole head being thrust into the tissues of the animal, and are retained there by horns which spring from the hind part of the head. Dr. Baird has, from this peculiar structure, named the tribe *Anchoraceraea*.* The feet are either very small or wanting.

FAM. *PENELLADÆ*, Baird.

There are several pairs of feet situated on the under surface of the body, near the head, but they are very small.

Gen. 186. LERNEONEMA, *M. Edw.*

Body long, slender, narrowed in front and ending in a

* *Ἀγκυρα*, an anchor, and *κερας*, a horn.

swollen head, furnished with two or three curved, horn-like appendages; abdomen long and simple. Ovaries long, slender.

LERNEONEMA SPRATTÆ, Sowerby, sp. *Eye-sucker*. (Plate XX. fig. 3.)—Neck long, with about a dozen constrictions. Body slender; head with two narrow, somewhat hooked horns behind; ovaries long and slender.

Length of the body, an inch; of the ovaries, an inch and a half.

Attached to the eye of the sprat.

LERNEONEMA BAIRDII, Salter.*—Head with one simple hook, shaped like a horn; ovaries brightest emerald-green; body of a flesh-colour. Length, five-eighths of an inch; ovaries, one inch, four lines.

Eye of herring: Devonshire coast, near Teignmouth (Dr. Salter).

LERNEONEMA ENCRASICOLI, Turton, sp.—Body cylindrical, brown-horny colour; neck long, white, without constrictions. Length of body, about half an inch; of the ovaries, fully an inch.

Attached to the body of the sprat: Swansea Bay and Ireland.

* Ann. and Mag. Nat. Hist. 2nd ser. vi. p. 86, pl. vii. B.

FAM. *LERNEOCERADÆ*, *Baird*.

Under surface of body without any vestiges of feet or other appendages.

Gen. 187. *LERNEOCERA*, *Blainv.*

Head with horn-shaped appendages, simple and symmetrical. Ovaries straight, and of moderate length. Body long and slender.

LERNEOCERA *CYPRINACEA*, Linn. sp.—Head with four long, slender, horn-shaped appendages. Length of animal, about eight lines.

Barbut mentions this as a common species on the sides of the carp, bream, and roach, in many of our ponds and rivers; but Dr. Baird says he has not seen specimens of this species.

Gen. 188. *LERNEA*, *Linn.*

Body more or less twisted; head with horn-shaped appendages, irregularly branched; ovaries twisted into round masses; abdomen of considerable size.

LERNEA *BRANCHIALIS*, Linn. *Gill-sucker*. (Plate XX. fig. 4.)—Whole animal of a firm consistence, being hard

and horny; the body of the thorax swollen in the middle, and twisted on itself like the letter S.

Gills of the cod: found in Ireland, in Belfast and Dublin Bays.

SUPPLEMENT.

Dr. J. R. Kinahan* has lately described a strikingly distinct species of *Crangon* as the

CRANGON ALLMANI, Kinahan. *Channel-tailed Shrimp*. —Carapace smooth, excepting a small spine on the median line of the gastric region, and one on each branchial; second pair of legs as long as third; sixth segment of abdomen deeply channelled above; channel continued as a shallow groove on terminal segment; third joint of anterior pair of legs spined; a minute spine between the insertion of second pair of legs in males; in the female, spine obsolete. Length from one inch and a half to three inches. It is of a bluish-grey colour, dotted over with brown, red, and gold.

Found by Dr. Kinahan in the coralline zone of the Irish

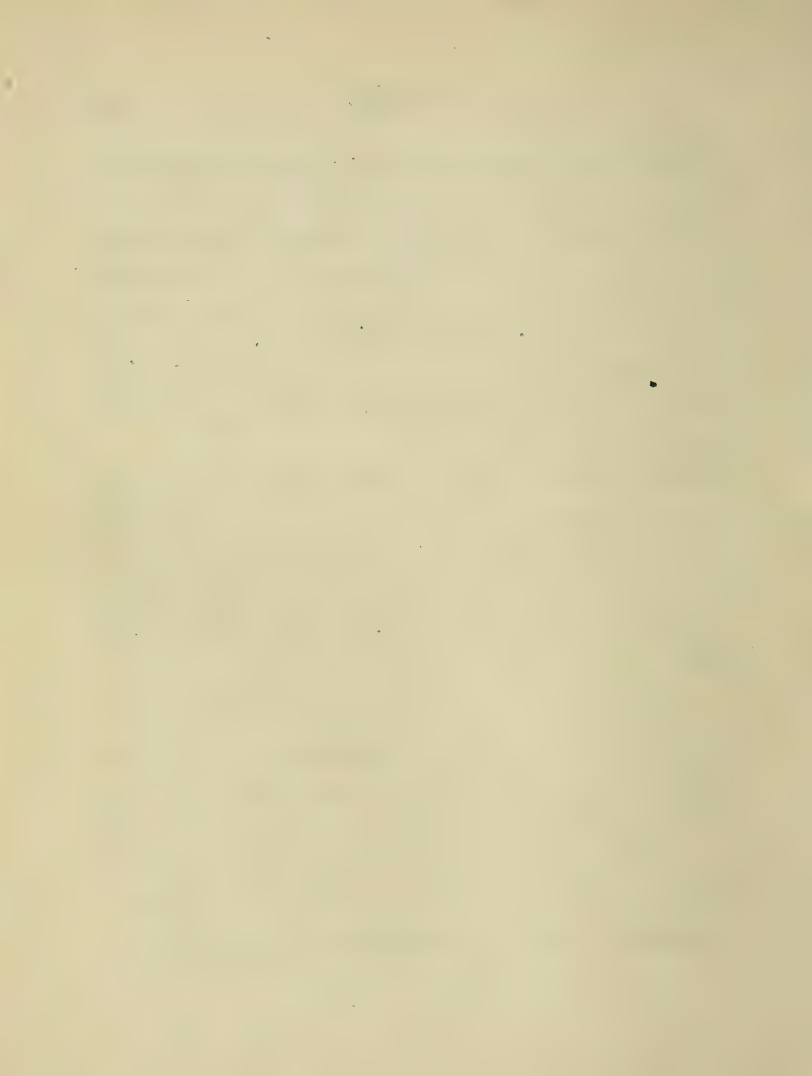
* Proceedings of the Dublin Natural History Society, vol. iv. p. 81.

Sea, near Bray, County Wicklow, in December 1856, and February 1857.

Dr. Kinahan has described as *Pagurus Eblanensis* what he himself subsequently thinks may be the *P. ulidianus*; and under the name of *Porcellana priocheles*, what is perhaps "merely a young form of *P. longicornis*." He has kindly forwarded to me the brief description of what he deems a new species of *Hippolyte*, found along with the *Crangon*, and at Dalkey.

HIPPOLYTE ANDREWSII, Kinahan. Allied to *H. Cranchii*. —Apex of rostrum with three teeth above; median plate of tail furnished with five pairs of lateral spines; external antennæ longer than body; second pair of legs five-jointed.

Colour rose-pink, with darker bands; ova bright emerald-green.



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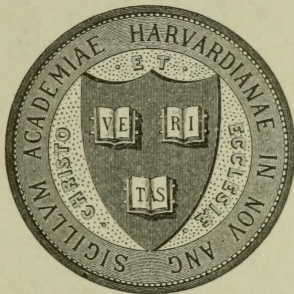
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